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1982 INPUT-OUTPUT MODEL AND ECONOMIC MULTIPLIERS FOR THE SAN FRANCISCO BAY REGION

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Oakland, California

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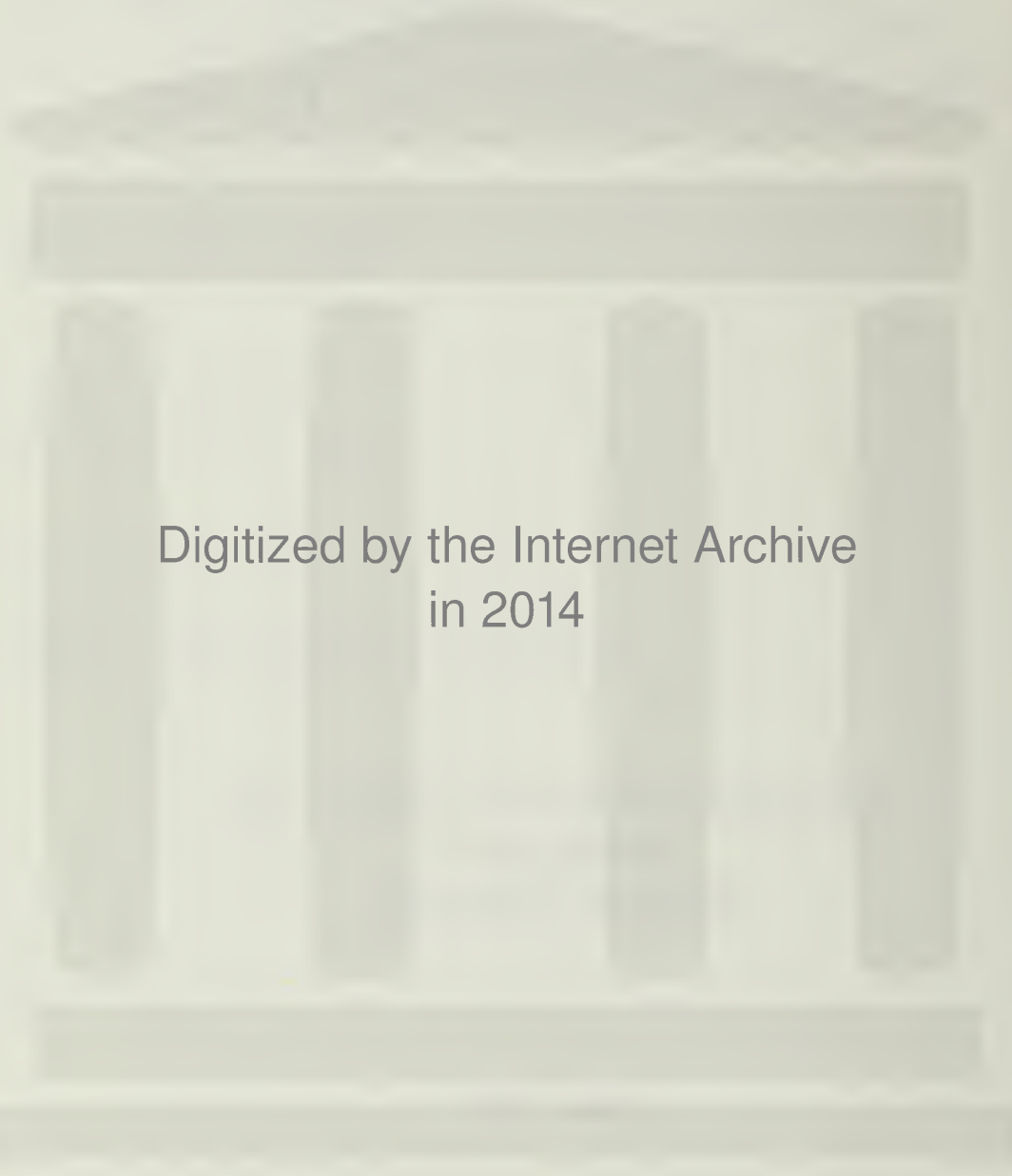

Introduction to Input-Output Analysis

Input-output tables provide a flexible framework for analysis of economic issues of significance to planners and policy makers. This task is accomplished by disaggregating an economy into its constituent sectors, providing a format within which these sectors can be studied in depth and relating structural interdependence of the economy to consumption patterns.

Historically, the first known attempt to organize the macro-economy can be traced to Francois Quesnay who published **Tableau Economique** in 1758. Quesnay depicted an economy as a circular system in which the buying or selling of goods would be felt throughout the economy. (See Kuczynski and Neer, 1972)

About a century later in 1874, Leon Walras published **Elements d'economic politique pure**. This study presented a theoretical general equilibrium model which essentially consisted of a set of equations illustrating the price mechanism in the economy (See Jaffe, 1954).

The culmination of the work started by Quesnay came in the 1930s when Professor Wassily Leontief of Harvard developed a general theory of production based on the notion of economic interdependence and published the first input-output table of the American Economy (See Leontief, 1936). Leontief ignored prices, and consequently substitution, and assumed that each product was supplied by only one sector with constant returns to scale, so making possible the empirical application of input-output models. The basic equation system of an input-output model is:

$$(I - A)^{-1}Y = X \qquad (1)$$

where: A = a matrix of inter-industry technical coefficients
Y = a vector of Final Demands
X = a vector of Gross Outputs
I = an identity matrix of the same order as A.

The expression $(I - A)^{-1}$ is generally known as the Leontief inverse matrix.

Traditionally, input-output models have been used in three main areas (see Chenery and Clark, 1959). Perhaps the most important has been the use of the Leontief inverse matrix in the structural analysis of an economy. Here assumptions are made about changes in the level of sectoral final demands. The effect on the whole economy, or on sectors within the economy, is assessed by studying the rows, or the columns, of the inverse table. The focus of interest is on the direct and indirect impact of a unit change in the final demand of one industry on all other industries.

Other applications in the field of structural analysis might involve changing the level of imports or adjusting individual entries in the original transactions table which shows the pattern of interindustry sales and purchases, and assessing the ramifications throughout the economy after computing a new inverse matrix.

A second major area of application involves the use of input-output tables as the basis of regional and national forecasting exercises. In many respects, this type of work is closely related to the structural studies referred to above, since projections invariably involve the use of an inverse matrix and a vector of final demands. However, in a forecasting exercise the final demand vector has to be predicted independently in terms of all of its components, and in this respect differs from a structural study in which only one element of final demand may be changed. When the Leontief inverse is used for forecasting, the final demand vector is multiplied by the inverse matrix to give a new vector of total outputs. If a new transactions table is required, this output vector has to be multiplied by the original direct coefficients table, emphasizing again the assumption that the technical relationships between industries are invariant over time. The weaknesses inherent in this type of approach stem from the assumptions that production relationships remain unchanged. In an attempt to improve the accuracy of forecasting based on input-output models, modifications have been introduced to the basic model described above to make it more dynamic and to allow for changes in interindustry relationships. Theoretical problems of dynamic models have been largely solved (Leontief, 1970), but empirical applications have lagged.

A third major area of application work has involved the detailed study of the nature of interdependence in an economy. This kind of analysis can be especially valuable in comparing the economic structure of different regions of the country. In this way, one is able to examine possible growth paths of each region and identify capacity bottlenecks.

Unfortunately input-output accounts in the United States have encountered deep seated resistance in the past over the question of whether the method would facilitate any move toward central planning, Evans and Hoffenberg as presented by Polenske allude to this resistance: (See Polenske, 1980).

"An illusory fear is that the [input-output] approach constitutes a potentially undesirable planning device. The word "planning" has acquired a rather unsavory semantic content, especially when linked with the word "government." It has come to imply some kind of belief that productive operations should be directed by a central authority; in other words, a belief in some form of socialism. This has been extended to imply that any device that might make planning more practical is somehow undesirable. When clearly stated, this is an obvious non sequitor.

A good deal of misunderstanding about what the interindustry-relations approach can do, or is intended to do, undoubtedly comes about through the vague meaning of the word planning. . . . The suggestion that interindustry relations, as a technical device, might help to make socialism more "practical" is arguable but irrelevant. . . . another fear of misuse related to planning is that input-output methods may somehow be used in connection with the imposition of production controls and materials allocations. . . ."

San Francisco Bay Area Input-Output Model

The San Francisco Bay Area Input-Output Model is a model of a single region for the year 1982. Each cell in the interindustry transactions table shows the amount that an industry in the region purchases from itself or from other industries in the same region. These flows are expressed in percentages in the San Franscisco Bay Area Table. Trade flows between regions is usually dealt with only in terms of total inflows and total outflows, which are not differentiated by region of origin or destination. Data required to implement the model are regional interindustry flows and regional demands for a given year.

The basic assumptions made in the construction of the San Francisco Model are the following:

a) constant returns to scale
b) homogeneous products with no joint production
c) fixed direct input (technology) coefficient
d) no subsitution of one input for another

The assumption of constant returns eliminates the impacts of external economics on the production process, and the second assumption assumes identical products within an industry. The third one assumes fixed technologies. A check of the national 1972 and 1977 input-output tables indicated that for most industries the technical coefficients were relatively stable. Carter (See Carter, 1970) has verified that input-output coefficients remained relatively stable for the U.S. for the years 1939, 1947, 1958 and 1961 over the short-run. The major shifts in production and input substitution brought on by the energy crisis may have created changes. Major changes have taken place in the input coefficients of electronics components between 1972 and 1977 in the national takes. Technology substitution in the use of electronics and computers will continue. In the appendix of this report, the 1977 United States Input-Output Direct Requirements Table is presented as a comparison to the Bay Area 1982 I/O Direct Requirements Table.

Input-Output Coefficients

Discussion thus far has been limited to the framework for tracing the actual flows of goods and services among industries. Having determined the historical network of interindustry transaction, how can we use this pattern to forecast future levels of industry activity? More specifically, what determines the values X_i and X_{ij}?

Economic theory offers a hypothesis to explain the relationship between the purchases by industry j_{th} from industry i. The magnitude of X_{ij} depends on the level of output of the j_{th} industry. Increases or decreases in the output of an industry are to be accompanied by increases or decreases in the various current inputs absorbed by the industry. This proposiston is merely a statement of the law of costs--larger outputs require more inputs--and may be described generally as follows:

$$x_{ij} = F(X_j) \qquad (2)$$

This form does not specify the exact character of the relationship. The law of costs merely states that this relationship is restricted making the function a monotonically increasing one. Under these conditions the ratio of x_{ij} to X_j need not be constant. It is usual, however, to write this relationship in a more restricted form, namely:

$$x_{ij} = a_{ij} X_j \qquad (3)$$

where a_{ij} is a constant coefficient of production termed a "flow coefficient." It implies a linear homogenous relationship between the output of an industry and the various industrial supplies and services the industry must purchase to produce output. This form of production coefficient is not a theoretically valid generalization but is an approximation.

Each of the a_{ij} values is estimated from past ratios of x_{ij}/X_j. A complete set of flow coefficients for an input-output model of industries forms a square matrix,

$$\begin{matrix} a_{11}, & a_{12} & \cdots & a_{1n} \\ a_{21}, & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{n1}, & a_{n2} & \cdots & a_{nn} \end{matrix} \qquad (4)$$

in which each column describes the estimated fraction materials, energy, and services required from other industries by a given industry per one dollar of its output. By treating flow coefficients (a_{ij}) as independent structural parameters in a system of equations, the substitution effects caused by relative price changes are ruled out.

Some argue that the importance of substitution due to changes in relative prices has been exaggerated in production economics. The degree of complementariness among inputs is so high that even wide variation in their relative prices could only slightly affect the combination of inputs that would be used.

Moreover, insofar as relative price changes are important to particular industries, such changes themselves are in large part the consequences of technological changes. That is, changes in the technology of production alter the industrial demand for inputs and, through this impact upon market, lead to relative price variations. If this is so, it is more the coefficient structure of production which determines prices than prices determining the coefficient structure. However, the issue is not a matter of basic theory but a matter of emphasis; the assumption of fixed coefficients within a given technology is used as a pragmatic simplification.

The development of the flow coefficient matrix is central to the input-output concept because it sets behavioral patterns for translating the implications of a set of final demands (Y's) into levels of industry activity (X's) required to achieve those final demands.

The economic significance of the flow coefficient matrix is that both the direct and indirect production requirements implied by any level of final demand can be solved. For example, if the demand for automobiles changes by $1.00, the inputs needed to produce automobiles increase by some proportional amount. Its purchases of steel, glass, paper, paints, electrical parts, fuel and so forth, are described by its column in the coefficient matrix. Suppliers of these products, in order to make deliveries to the automobile industry, must purchase inputs from other industries, whose amounts per dollar of their sales likewise are described by their column coefficients. These suppliers in turn place orders with other suppliers. The demands upon the outputs of each industry to support the production of $1.00's worth of automobiles may be accumulated to show how much production must take place in each industry to supply the automobile industry, its suppliers, and their suppliers' suppliers, etc. This computation is analogous to the Keynesian income multiplier which measures the effects of changes in respending for consumption upon income; but in the input-output framework, the respending effects for inputs are accumulated and it is the output (or sales) of each industry which is measured.

A more convenient way, certainly more compact, of representing a system of input-output equations is in vector and matrix notation. Let X represent a vector of outputs whose values are to be determined for each of n industries, Y represents a vector of final demands, and A the matrix of flow coefficients. Then,

$$X = AX + Y \qquad (5)$$

which states that the outputs of different industries depend upon the demands for inputs by industry and demands for inputs by final users. Since the A matrix is a given constant and the Y vector is independently determined, the solution of the X vector is obtained as follows:

$$X - AX = Y \qquad (6)$$

$$(I-A)X = Y \qquad (7)$$

where I is an identity matrix bearing the relationship in matrix notation of the number one in the diagonal and zeroes elsewhere. Dividing both sides by (I - A) we obtain:

$$X = \frac{I}{I - A} Y \text{ or } \quad X = (I-A)^{-1}Y. \qquad (8)$$

The expression $(I - A)^{-1}$ is called the inverse matrix. Such a table constitutes the focus of an input-output study for impact analysis since it indicates both the direct and indirect effects upon the output of every industry per dollar's worth of final demand for the output of any one industry. It is a table of industrial output multipliers.

Adjusting National Matrix to San Francisco Bay Input-Output Matrix

In an article entitled "An Appraisal of Non-Survey Techniques for Estimating Regional Input-Output Models," David G. McMenamim and Joseph Haring state (See McMenamin and Haring, 1964) that:

"Non-survey or minimum-survey methods for constructing regional input-output tables are attractive to model builders because of the relatively small cost involved as compared with full survey models."

McMenamin and Haring go on to state that many of the non-survey techniques have not been highly successful in the past, but recently accuracy seems to improve by the use of newly developed techniques. Indeed, the full survey of building input-output tables are costly.

The basic method employed in this study to adjust the national Input-Output table to the San Francisco Bay Area is the RAS or Biproportional Matrix Adjustment Method. The basis of the RAS Method is the hypothesis [See Stone] that various determinants of change in input-output coefficents (economies of scale, technological evolution, variations in relative prices) may be summarized by biproportional relationships in which each industry is characterized by a pair of "substitution" and fabrication multipliers (r_i and s_j respectively) which are assumed to operate uniformly over the rows and columns of the input-output matrix. In its simplest form, RAS involves the determination of a set of values for r_i and s_j which when applied to an observed base year coefficient matrix A, generates a second matrix A_1 whose elements generate a pair of vectors U_1 and V_1 representing observed values of intermediate outputs and inputs by industry in the update year. In mathematical terms, the problem is therefore to find:

$$A_1 = r_1 A s_1 \qquad (9)$$

where: A = a nonnegative m x n matrix that is mapped by row and column multiplication into a nonnegative m x n matrix A_1

r_1 = An unknown m x m diagonal matrix of row multipliers

s_1 = An unknown diagonal n x n matrix of column multipliers.

$R_1 S_1 > 0$

when this biproportional relation is to be solved for A_1 and r_1 and s_1 by means of known row totals (u) and column totals (v) prescribed for A_1, by using the RAS procedure, the existence problem of constrained biproportional matrices has to be considered. The iterative RAS procedure is a way of approximating a solution asymptotically.

To quote Bacharach (See Bacharach, p. 46)

"Starting with the given Matrix A, one multiplies each row by a scalar that will make the row sum equal the row constraint, next multiplies each column of the resulting A^1 by a scalar that will make its sum equal its constraint. This given a Matrix A^2 that serves as a starting point for the next iteration."

This process of row and column multiplication continues until the calculated intermediate inputs and outputs are equal to observed levels for each industry. The process is mathematically efficient and convergence occurs usually around the ninth iteration.

Data requirements to adjust and update the 1977 National Input-Output Table to the Bay Area consisted of three elements. These are: gross outputs by industry sector; intermediate inputs and intermediate outputs by industry sector. Gross outputs by sector were estimated from published reports. Estimating intermediate inputs and outputs were more diffficult. A first step in estimating intermediate inputs was to determine the value added component of producer prices in the Region. From this estimate of value added, the gross regional product (GRP) could be estimated. Next the total value of intermediate outputs could be estimated as a residual, since gross output minus gross regional product equals total intermediate output. Next final demand by sector was estimated for each sector. Staff used other I/O tables for the Region, industry records on exports, capital investment in local plant and equipment data and government purchase data. Personal Consumption Expenditure data was assumed to follow the same distribution as the national 1977 pattern. The final demand by component was summed to derive an estimate of total final demand for each sector. The sectors final demand was substracted from gross output by sector to obtain the initial estimate of intermediate outputs by sector. Intermediate inputs were estimated also as a residual. Value added by sector and gross inputs were obtained from the 1982 Economic Censuses for 75% of the sectors. Indirect business taxes were assumed to follow the same pattern as at the national level. Import estimates were partly derived from the 1982 **Commodity Transportation Survey Summary** for the State of California and by professional judgement. The sum of value added plus indirect business taxes and imports were subtracted from gross inputs to obtain the initial estimate of intermediate inputs by sector. After applying the RAS procedure to the 1977 National I/O, further adjustments in the intermediate inputs and outputs were made. Finally, each sector was evaluated by staff for reasonableness in terms of our knowledge of the area economy. The focus of review was concentrated on those sectors that contributed significantly to the area economy.

Table 1

ECONOMIC LEVEL OF 1982 ABAG REGIONAL INPUT OUTPUT MODEL
($ 1,000)

SECTOR NAME	GROSS OUTPUT	INTERMEDIATE		FINAL DEMAND
		OUTPUT	DEMAND	
AGRICULTURE, FORESTRY, AND FISHERIES	784600.	380900.	231900.	403700.
MINING	341200.	200300.	74800.	140900.
CONSTRUCTION, RESIDENTIAL	1989000.	0.	894300.	1989000.
CONSTRUCTION, NON-RESIDENTIAL	3025000.	0.	1139900.	3025000.
CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES	974000.	0.	429800.	974000.
MAINTENANCE AND REPAIR	1209000.	889000.	303300.	320000.
ORDNANCE	3037800.	107800.	822900.	2930000.
FOOD AND BEVERAGES	7024900.	1394200.	2362400.	5630700.
TEXTILE AND APPAREL PRODUCTS	943300.	514400.	221256.	428900.
LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES	1601900.	857100.	326500.	744800.
PRINTING AND PUBLISHING	2179600.	1075500.	503000.	1104100.
CHEMICALS AND ALLIED PRODUCTS	2342200.	839200.	602500.	1503000.
PETROLEUM REFINING AND RELATED INDUSTRIES	7752200.	2642300.	1034000.	5109900.
RUBBER AND LEATHER PRODUCTS	707300.	485200.	170500.	222100.
STONE, CLAY, GLASS, AND CONCRETE PRODUCTS	936000.	314000.	260400.	622000.
PRIMARY METAL INDUSTRIES	1062700.	466000.	329000.	596700.
FABRICATED METAL PRODUCTS	2320100.	1296900.	710000.	1023200.
NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS	1514900.	691500.	241600.	823400.
COMPUTERS AND OFFICE EQUIPMENT	6582100.	1903100.	2508900.	4679000.
ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS	359100.	171500.	102000.	187600.
HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V	2657000.	750700.	624400.	1906300.
ELECTRONIC COMPONENTS AND EQUIPMENT	6068000.	2259100.	1479300.	3808900.
TRANSPORTATION EQUIPMENT	2031500.	194300.	426600.	1837200.
PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEO	2925800.	907700.	694900.	2018100.
TRANSPORTATION SERVICES	4300100.	1319600.	1198500.	2980500.
TRUCK TRANSPORTATION	2140200.	1368600.	792600.	771600.
COMMUNICATION	2652000.	1074200.	542000.	1577800.
UTILITIES	6988500.	3586100.	1664600.	3402400.
WHOLESALE TRADE	8276000.	3483000.	2342000.	4793000.
RETAIL TRADE	11522000.	1697100.	2831000.	9824900.
F.I.R.E.	28446000.	8359000.	7937000.	20087000.
HOTELS AND LODGING PLACES	979300.	37000.	439400.	942300.
PERSONAL AND REPAIR SERVICES	1958900.	146800.	483300.	1812100.
BUSINESS AND PROFESSIONAL SERVICES	6605200.	3415900.	2237800.	3189300.
AMUSEMENT AND RECREATION SERVICES	850000.	270600.	219400.	579400.
HEALTH SERVICES	7709800.	499000.	1382100.	7210800.
EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFI	7229200.	219000.	1981100.	7010200.
GOVERNMENT NOT ELSEWHERE CLASSIFIED	10122500.	486500.	3704900.	9636000.

Table 2

INDUSTRY SECTOR IDENTIFICATION

Number	Description	1972 S.I.C.
1.	Agriculture, Forestry, Fisheries	01-09 (Excluding 047)
2.	Mining	10-14
3.	Construction, Residential	152, 153, 171, 172, 1751, 1752
4.	Construction, Non-Residential	154, 173, 174, 176
5.	Construction, Highways and Public Utilities	161-162
6.	Maintenance and Repair	176, 177, 178, 179
7.	Ordinance	348, 3761, 3795
8.	Food, Beverages	20, 21
9.	Textile and Apparel Products	22, 23
10.	Lumber, Wood, Paper Products Furniture	24-26
11.	Printing and Publishing	27
12.	Chemicals and Allied Products	28
13.	Petroleum Refining and Related Industries	29
14.	Rubber and Leather Products	30, 31
15.	Stone, Clay Glass and Concrete	32
16.	Primary Metals	33
17.	Fabricated Metals	34 (exc. 348)
18.	Non-Electrical Machinery, Except Computers	351-356, 359, 358
19.	Computers and Office Equipment	357
20.	Electric Transmission and Industrial Apparatus	361, 362

21.	Household Appliances, Lighting Appliance, Radio, T.V., Communication Equipment	363, 364, 365, 366
22.	Electronic Components & Equipment	367, 369
23.	Transportation Equipment	37 (exc. 3761, 3795)
24.	Professional, Scientific Equipment and Miscellaneous Manufacturing	38, 39
25.	Transportation Services	40, 41, 44-47 (exc. 4789)
26.	Truck Transportation	42, 4789
27.	Communication	48
28.	Utilities	491, 492, 493, 494-497
29.	Wholesale Trade	50-51
30.	Retail Trade	52-59
31.	F.I.R.E.	60-67
32.	Hotel and Lodging Places	70
33.	Personal and Repair Services	72, 75, 762-764, 7396
34.	Business and Professional Services	73 (exc. 7396), 769, 81, 89 (exc. 892)
35.	Amusement and Recreational Services	78, 79
36.	Health Sciences	80, 074
37.	Local Educational Services, Non-Commercial R&D, Non-Profit Professional Organizations	82, 83, 84, 86, 892
38.	Government, Not Elsewhere Classified	91-97, 4311

Before the biproportional adjustment procedure was applied to the 1977 national I/O model, staff analyzed the share of gross regional product contributed by any one sector to identify the top dozen or so sectors that contributed significantly to the regional economy. Location quotients were used to identify important sectors. In specific, they identified those sectors where regional specialization was most significant. Using information from Czamanski and Malizia (See Czamanski and Malizia, 1969), we looked at those quotients which were in excess of 1.5. The value 1.5 was arbitrarily determined. Professional review of row and column cells focused on these sectors.

Smith and Morrison undertook a test of the best known methods for adjusting survey based I/O tables for the same spatial area and found "the semisurvey method based on the RAS technique proved to be by far the most efficient simulation procedure, judged according to the distance of the estimated trade coefficients matrix from the survey-based table." (See Smith and Morrison, p. 78)

Table 1 presents estimated gross output, final demand, intermediate demand and output levels and value added for the period 1982. They represent the estimated economic potential of the nine counties that compose the San Francisco Bay Region. Data sources for those values were:

Census of Manufacturing, Wholesale Trade, Retail Trade and Services (1982)
California Franchise Tax Board
Annual expenditure reports of local governments
Annual reports of public utilities in the Bay Region
Annual construction reports and value of construction permits issued
California Statistical Abstract
1982 Commodity Transportation Survey Summary

All values are expressed in 1982 dollars.

Direct Coefficient Matrix of the San Francisco Bay Input-Output Model

Table 2 presents the industry sectors. (All remaining tables are found in the appendix of this report). Table 4 contains the 1982 Direct Coefficient Matrix. The regional economy is represented by thirty-eight industry sectors, representing the trade flows between industries in the nine-county region. Each row shows the fraction of total sales by the sector named at the left to all sectors in the nine-county area, and the final demand sectors in the region. Table 5 in the appendix contains the most recent survey-based 1977 National Input-Output Table and is presented as a contrast to the 1982 Hybrid Bay Region Input-Output Table.

Inversion of Direct Coefficient Matrix

Table 6 presents the inverted $(I-A)^{-1}$ direct trade matrix for the 1980 regional model. This table shows the direct and indirect requirements per dollar of delivery to final demand by each of the industry sectors. As is customary, households are not included because Table 3 is designed to reflect the multiplier impacts among industries only.

To use Table 6, consider the following. Each time one of the processing sectors adds one dollar to final sales the direct and indirect effects are obtained by reading down that sector's column. For example, every dollar of output of the computer and office equipment sector (sector 19) requires 11 cents worth of parts from the electronic industry (sector 22) in the Bay Area. This 11 cents represents both the direct and indirect impact on the Bay Area electronics industry due to a $1 change in purchases from the Bay Are computer industry. That is, for each increase in sales for the computer and office equipment industry in the Bay Area, the electronics industry must also increase their purchases from local sectors that supply them. Therefore, each additional sale by computers and office equipment to final demand sets off a chain reaction. This chain reaction reflects the impacts of suppliers having to provide the electronics industry with materials in order for it to satisfy the demand of the computer and office equipment. This "chain reaction" effect can be seen by comparing the direct sales from the electronics industry to the computer industry (Table 4) to direct and indirect impact table (Table 6). In the direct requirements table, the computer industry purchased 7.3 cents of inputs for every dollar of output. But the economy-wide impact (Table 6) results in 11 cents.

This 11 cents represents a 57% increase over the direct requirement of 7 cents for each $ 1.00 change in final demand because of the inclusion of secondary demands of other industries supplying the electronics industry.

By comparing Table 4 and Table 6, it is possible to determine for each sector the difference between direct and indirect requirements.

Table 7 presents the results of including households in the processing sectors. The purpose of the inclusion is to develop income multipliers. This table includes the impacts of labor and inputs on the ripple effects of changes in final demand. It assumes also that economy becomes self-contained in the region, resulting in little or no leakage of property income outside of the region. After creation of a direct, indirect and induced table, Type I and Type II income multiplier may be produced. Following the procedures outlined by Richardson (See Richardson, page 39), these multipliers were developed. In the open model (excluding households as a processing sector) (See Table 4), the column sum is defined as output multiplier. These multipliers by industry measure the sum of direct and indirect requirements from all sectors needed to deliver one additonal $1.00 of output to final demand. Although the output multipliers represent total requirements per $1.00 of final demand, they are not particulary useful, except as indicators of the structural interdependence between each sector and the rest of the economy. **That is, the higher the multiplier; the greater the interdependence with other local sectors.** Normally, the highest multipliers are found in construction, trade and services sectors. This stands to reason because the sectors import little into the region relative to other sectors. Instead, they purchase major inputs from production industries locally.

Multiplier Analysis

Uses of input-output models fall into two categories, regional forecasting and multiplier analysis. A regional forecast is a projection into the future of the behavior of the regional economy in its entirety. In contrast, multiplier or impact analysis predicts the overall change in the economy usually as a consequence of an isolated change in the final demand of one of its industries. Of the two uses, multiplier analysis is by far the more common, being extensively employed for decision-making in both the private and public sectors.

The proper use of multipliers is essential in analyzing the impact of projects. Although the basic notion of a multiplier is a relatively simple one, the first step is to outline a few of the fundamental ideas underlying input-output multipliers, some of which tend to make their application more difficult than is first apparent. Later in this section, these thoughts will be further discussed in the context of some specific examples of multipliers and impact analyses.

Basic Multiplier Concepts

There are four points that might be made with regard to input-output multipliers. The first deals with the general definition of a multiplier.

- Multipliers measure the repercussions of the change in the level of one economic variable on the level of another variable. In the context of a Keynesian macro-economic model, one commonly studied multiplier is the government expenditures multiplier, which estimates the change in aggregate income as a consequence of a dependent variable (in our example, income) in the numerator and the independent variable (government expenditures) in the denominator. There are a vast array of multipliers of potential interest to economists. Indeed, the conceivable number of combinations of dependent and independent variables forming multipliers is infinite. For regional analysts, reference to commonly used multipliers is found in expressions like "the change in regional income from an increase in the exports of farm commodities" or the decline in the total number of local jobs as a result of a plywood mill's closure.

- The second point is a reiteration of the concept that the Leontief inverse matrix is the basic ingredient in input-output multiplier analysis. As we have noted, the general solution of an interindustry model is given by equation,

$$X = (I-A)^{-1}Y \qquad (10)$$

  The inverse matrix is a table of output multipliers, representing the repercussions on the output of individual industries from changes in the final demands of other industries. For a 38-industry input-output model, there are 1,444 (38 x 38) output multipliers in the inverse table.

These output multipliers are not only of importance in their own right, but they provide the bridge to a variety of other useful input-output multipliers. For example, a value added multiplier, showing the Gross State Income required directly and indirectly from industry i to support a dollar of final demand of j, is a simple transformation of the output multiplier. If the value added coefficient, v_i, measures the value added in industry i per dollar of output (i.e. $v_i = V_i/X_i$, where V_i is the value added in i), the value added multiplier, ${}_vM_{ij}$, is given by:

$$ {}_vM_{ij} = b_{ij}v_i. \qquad (11) $$

Similar multipliers, including their aggregate counterparts (i.e., the so-called Type I and Type II multipliers), can be developed for income and employment, as is demonstrated below.

- The third fundamental notion about input-output multipliers is that their values are dependent upon the restrictions implied by the specification of the interindustry model. Three key assumptions employed in regional input-output formulations involve the form of the output equations, the stability of purchase coefficients, and model closure. Because of the ease with which the mathematical model can be manipulated, the output equations are linear and homogeneous. Furthermore, in order to render the model operational for forecasting purposes, the assumption of constant regional coefficients is invoked. The issue of closure deals with the degree to which the variables of the model are made endogenous. In impact studies income and consumption are treated as endogenous variables (the Type II formulation of an input-output model), although this is not always the case. If one or more of these restrictions are modified (e.g., if regional coefficients are assumed to vary in the future at some projected rate), the values of the multipliers will be altered. **Analysts should always keep in mind the implication that model specification has for values of multipliers and impact assessments.**

- The final point is also related to model specification. The multipliers derived from the San Francisco Bay Area input-output tables are described as being static. The underlying models depict the regional economy in timeless states of equilibrium without taking into account the length of time required to make the adjustment. More general specifications of input-output systems would consider the effects of time. Multipliers derived from formulations in which time lags, variable capital stocks, or temporally changing coefficients play a role are termed dynamic.

Specification of Multipliers

A summary measure of the potential impact on the regional economy of an expansion or decline of an industry is given by that sector's aggregate multiplier. Input-output multipliers of this sort are derived from the inverse matrices, and can be stated in terms of value added, income, and employment, among other variables, depending upon the problem at hand.

A so-called Type I income multiplier for sector j expresses the sum of the direct and indirect income changes in all industries of the economy from a dollar increase in the final demand of j. As we have previously noted, this multiplier is a simple transformation of the output multipliers given in the inverse matrix, B.

The Type II household multiplier captures the repercussionary effects of the feedback loop that runs through earned household income and consumption expenditures. It therefore measures the direct, indirect, and induced value added in all industries per dollar of final demand of industry j. The inverse matrix, B, in this case is based upon a direct requirements matrix, R, expanded to include a household row and column.

Regional impact analyses are frequently preoccupied with the employment creating effects of industrial expansion, because regional policy makers may be primarily concerned with forecasting jobs in a particular area. For this reason, it is often useful to be able to derive employment multipliers, as well as income multipliers from the I/O model.

Given the slopes of the employment-production functions, the calculation of employment multipliers is relatively straightforward. The direct employment change for sector j is the slope of its employment-production regression line. The direct plus indirect employment change for j consists of a coefficient for each i multiplied by the total direct and indirect requirements from each i for one unit of final demand to j, and summed:

$$eM_j = e_i b_{ij} \qquad (12)$$

The above multiplier is analagous to the Type I income multiplier and is the ratio of this direct plus indirect employment change to the direct employment change. Similarily, there is an employment multiplier parallel to the Type II income multiplier which measures the ratio of the direct, indirect and induced employment change to the direct empoyment change. The former is given for sector j by:

$$II\ eM_j = e_i h^*_{ij} \qquad (13)$$

where h^*ij represents an entry in the expanded inverse matrix with households endogenous.

An important consideration about Type II multipliers for both employment and income should be stated. Since Type II multipliers assume that the economy is "closed", (that is, there is no leakage of income from the economy), Type II multipliers should be viewed as representing the maximum theoretical impact level.

In reality, the actual multiplier probably will fall somewhere between the Type I and Type II levels or less than Type I depending on the market size of the area being analyzed.

Numerical Examples of Multiplier Usage

Tables 8 and 9 present output, income and employment multipliers for the 1980 San Francisco Bay Area I/O model.

It may help to clarify the preceding analysis to illustrate the use of multipliers. Assume that a retail outlet plans to open in a community and that total estimated sales will be $1,000,000. per year. We want to estimate the output, income and employment impacts of this additional business on the region's economy.

First, estimate output impacts. Sales to final demand rise by $1,000,000 for retail trade (sector 30). This is multiplied by the output multiplier in Table 8. That is, $1,000,000 X 1.3400 = $1,340,000. Therefore, the total regional impact of a $1,000,000 increase in sales to final demand or retail trade is $1.34 million. This includes the $1 million direct impact and the $340 thousand indirect impact both on retail trade and all other sectors.

Next, let's estimate the Type I income impact of the increase to final demand on the regional economy. We multiply the increase by the multiplier by the household row. That is, $1,000,000 X 1.27 X 0.4885 = $620,395. This amount represents the total income impact associated with a $1 million increase in final demand at the regional level. The Type II multiplier is calculated in a similar manner. That is, the Type II multiplier impact is: $1,000,000 X 3.23 X 0.4885 = $1,577,855.

Finally, calculate the employment impact. Table 7 shows that the slope of the employment - production function for retail trade is 0.0363. That is, for every $1,000 of output increase employment increases by 0.0363 jobs. Therefore, an increase to final demand of $1,000,000 results in a job change of (363 X $1,000,000)/$1,000 =) 36.3 jobs. Next, we calculate the Type I employment impact which is (1.13 X 36.3 =) 41 jobs. Hence, the direct impact is 36 jobs and the indirect impact is (41 - 36 =) 5 jobs. The Type II employment impact multiplier indicates that the direct, indirect and induced impact is (36.3 x 2.20 =) 79.9 jobs. The indirect and induced impact is (79.9 - 36.6 =) 43.30 jobs.

The output, income or employment impacts calculated above reflect the **impact at the regional level.** The above also assumes that the jobs generated are **new jobs**, and not jobs being shifted from one part of the region to another. Also, Type II employment multipliers assume that their are no imports associated with the sector into the region, and wages, salaries and profits are totally spent in the regional economy. In economic terms, it assumes no leakage of wealth from the region.

Discussion so far has focused on the regional level. What about impacts at the county and smaller area? At the county level, the multipliers will be substantially less than at the region, and impacts at the city level would be even less. Why? The smaller the area; the greater the "economic leakages." What numerical value are these multipliers? Technically, they should represent the results of a I/O model for each county or city being studied. The economic costs to undertake such a project would be substantial. Therefore, in this discussion, **we only approximate their true values.** The actual multiplier either for a county or city will always be less than the regional multiplier. Therefore, the range impacts of the multiplier might be only slightly greater than the direct employment impact for a small community to a point somewhere between the Type I and Type II multiplier. **Exception:** It is highly unlikely that the employment multiplier for petroleum and related industries can realistically assess the secondary impacts of adding a direct job to that industry in the sub-regional area. The multiplier size reflects fundamentally the employment impacts associated with petroleum usage within the economy. The multiplier better reflects the employment impact associated with a reduction in output of petroleum in the region, with no substitution of petroleum imports. The localized impacts of a direct employment increase in petroleum and related products would be at best the Type I multiplier for a county, and substantially less for a city.

Let's look at our retail trade sector example. The Type I and Type II multipliers generate a secondary employment impact between 5 and 43 employees at the regional level. **For a county, one might use the mid-range between the Type I and Type II multiplier.** In this case, 24 employees or less. If we are looking at a large city (100,000 or more) within a county which still has land available for development or redevelopment, the secondary impact within the community might be the Type I multiplier or slightly greater, but no more than 50% of the mid-point calculated as the average between the Type I and II multipliers.

In communities that are less than 100,000, the Type I multiplier might be the most appropriate multiplier to measure **maximum local secondary impacts.** It is likely that the actual secondary impacts will range from the direct employment generated up to the Type I multiplier.

In many situations, planners, economists or engineers may not have information on the $ output of an industry. The only information may be building size. A table is presented that will help estimate employment given only building size information and some information about the potential type of economic activity that might occur in the building. Table 3 presents square feet per employee estimates for the floor area of a building by industry sector.

Table 3
Square Feet Requirements Per Employee by Floor Area and Industry

Industry Sector	Sq.Ft/ Employee	Industry Sector	Sq.Ft/ Employee	Industry Sector	Sq.Ft/ Employee
1	1400	14	470	27	210
2	250	15	550	28	250
3	250	16	350	29	700
4	250	17	470	30	450
5	250	18	420	31	300
6	250	19	420	32	840
7	-	20	290	33	860
8	600	21	300	34	350
9	350	22	400	35	870
10	700	23	300	36	300
11	350	24	290	37	500
12	650	25	1000	38	250
13	400	26	3100		

Source: **Estimating Land and Floor Area: Implicit Employment Projections** Vol. 1 Federal Highway Administration (1970); Association of Bay Area Governments (1986)

Sector names can be found in Table 2 in this report.

Now assume that a developer is proposing to build a 500,000 sq.ft. office building. You know that 100,000 sq.ft. will be devoted to retail trade; 200,000 sq.ft. will go to the business services sector, and the developer expects a bank to open an operation department in the building leasing another 200,000 sq.ft. From the industry sector table (Table 2), retail trade is sector 30; business services is sector 34, and banking operations falls under Finance, Insurance and Real Estate (sector 31). After identifying the sector number, calculate the direct employment associated with the sq.ft. by economic activity. That is, retail trade requires 450 sq.ft. per employee. The direct employment associated with the leasing of the space is (100,000/450) = 222 jobs in retail trade. Business services requires 350 sq.ft./employee. The available space in business services will generate (200,000/350) = 571 jobs in that sector. Finally, the banking operations requires about 300 sq.ft. per employee. This will generate (200,000/300) about 667 jobs. Therefore, the entire project is expected to generate **a maximum potential** direct employment of 1,460 jobs, assuming no vacanies. The actual employment due to purely economic conditions may be substantially less.

Next, calculate the indirect and induced employment effects of this project. The Type II employment multipliers (which assumes a closed economy) are: retail trade - 2.20; business services - 3.00, and F.I.R.E - 6.45. Retail trade will generate (222 X 2.20 = 488 - 222) a **maximum of 266 indirect and induced jobs** throughout the region under the most optimistic assumptions.

Business services will generate (571 X 3.30 = 1884 - 571) 1313 indirect and induced regional jobs. Banking operations will generate a maximum of 3635 indirect and induced regional jobs. Therefore, the total indirect and induced job impacts from this projects are approximately 5,214 jobs in the region. The direct impact of the new building is 1460 jobs.

How realistic are the indirect and induced employment impact numbers ? It depends upon a number of assumptions and economic conditions. First, the **Type II analysis assumes that the jobs going into the building are new regional jobs.** They are not being relocated from one part of the region or another. If they are relocation jobs, the impacts at the regional level will be insignificant. **Second, the Type II employment multiplier assumes that all purchases by the businesses come from enterprises in the region.** There are no imports into the region. It also assumes that all wages, profits and earnings are only spent in the region. These are severe restrictions, and therefore, **the Type II employment impacts on regional employment represent the most favorable scenario.** In practical terms, it is unlikely that the Type II multiplier level will be reached.

Type II multipliers are useful as evaluative tools by planners. Since these multipliers represent the most optimistic estimates of indirect and induced impacts, any number greater than this should be viewed with extreme skepticism. In this case, they provide an upper bound of "reasonableness."

As previously noted, the choice of a multiplier depends on a number of factors, such as relocation as opposed to new jobs, and the size of the area in which the multiplier is being applied (i.e. region, county, city). Following these considerations and the rules outlined above will provide a more realistic estimate of the project, and improve the credibility of the analysis.

Some Considerations in Multiplier Analysis

A further note of caution should be voiced with employment multipliers. Of the multipliers mentioned, the employment multipliers are the least stable. Technological substitution tends to reduce the labor portion of the direct coefficient which reduces the overall impact. Therefore, although these estimates are for 1982, the Type I and II multipliers may overestimate the employment impact given technological change over time in the specific industries.

The popularity of input-output for economic analysis is due in part to the simple and understandable structure of the model. Still, one can find many misuses--and even abuses--of input-output models. Although this is not the place for a thorough discussion of the methodology of impact studies, we might set down a few considerations, and in some cases words of caution, to be kept in mind during the course of a multiplier analysis. Some of these thoughts are only a re-emphasis of fundamentals that have already been discussed.

1. There is no single multiplier for an economy. One often hears the question, "What is the multiplier for the Bay Region?" Clearly, this question does not make much sense, since there are in fact many multipliers.

As we have noted earlier, a multiplier is an estimate of how one variable of the economy is expected to change when some other variable changes. A multiplier is composed of two parts, the dependent change (for example, the change in labor income) and the independent change (the increase in Other Foods' exports). The multiplier is simply the ratio of these two changes, the dependent change being the numerator and the independent change being the denominator. Conceivably, there are an infinite number of possible combinations of numerators and denominators and therefore an infinite number of possible multipliers. Some examples of multipliers not given that one might encounter are the following: the output of industry A per dollar of exports of industry B (i.e., the output multipliers given in an inverse matrix); the total payroll in the economy per dollar of direct payroll in industry C; the total regional value added per dollar of personal income; and total labor income per dollar of investment.

2. Multipliers are specified according to quite simplified assumptions concerning the behavior of the economy in response to change in demand and income. The value for a given multiplier is dependent upon the behavioral assumptions underlying the input-output model.

It is not possible to measure the "true" impact of a given change in an economy, since input-output models cannot depict exactly an economy's complex reaction to such a change. It is therefore not possible to state how much bias is associated with a given multiplier; that is, we cannot tell how much forecasting error is entailed with use of a given multiplier associated with our specifications. In any event whatever the choice of multipliers, the analyst should be aware of the possible bias in the impact assessment because of the restrictions inherent in the model's specification.

3. Accurate estimates of the direct impact are important. The most straight forward approach to estimating the impact on regional income of a plant expansion is to use the Type II income multiplier of the industry to which the plant belongs. This procedure of course presumes that the plant has an input structure equivalent to that of the industry as a whole. When one has no further information on hand, this is the most reasonable assumption to adopt.

However, when one does know the make-up of the plant's direct purchases vector, this information should be incorporated into the impact assessment. The basic reason for this is that once the direct value added is known, and one has reliable estimates of the other direct regional purchases, a good portion of the impact has been measured. As evidence of this contention is the fact that for many sectors the direct income coefficient represents about one-half of the total Type II income multiplier.

Furthermore, use of the aggregate industry multiplier can be misleading. Since each industry, even in the 38-sector input-output model, consists of establishments producing a variety of goods and services and requiring different bundles of inputs, a given establishment's multiplier may be quite different from the "average" industry multiplier.

4. The use of historical multipliers should be of minor concern on impact studies. Criticism of input-output models has focused upon the assumption of temporally constant coefficients, an assumption commonly invoked to render the models operational. There are several potential causes of regional coefficient change--technological change, variations in product mix, price changes, input substitutions, and shifts in trade patterns--but the question of coefficient instability is essentially an empirical one. The criterion with which to gauge the importance of coefficient change is the degree to which such change impinges upon the quality of input-output forecasts. For impact analysis, this issue translates to how stable the multipliers are over time.

For income impacts the use of historical multipliers does not seem to be a critical problem. Income characteristics change a a slower rate than the technological impacts on employment.

We should point out again that the constant multiplier assumption is not valid for Type II jobs multipliers, as we have defined them here. While it may be reasonable to assume that the aggregate income of an economy required directly and indirectly to support a given increase in the final demand of some industry does not change over time, we do expect the employment requirements to decline because of productivity gains. It is therefore necessary for analysts to update job multipliers by estimating the jobs-per-output ratios for the relevant forecasting period.

As a means of capsulizing this contention, we might suggest a list of concerns for input-output practitioners when making impact studies. Five concerns are listed in their apparent order of importance. These are (1) the possible misuse of multipliers; (2) the choice of the specification of the input-output model; (3) measurement error in the direct purchases vector; (4) measurement error in the base-year input-output model, especially if it is not derived from a survey-based table; and (5) the temporal instability of multipliers.

5. High multipliers are not necessarily good; and low multipliers are not necessarily bad. It is sometimes suggested that development of Industry G instead of Industry H should be promoted since the former has a higher multiplier. Such statements contain at least two fallacies. First, as we have seen, an impact is multi-dimensional, entailing induced effects on a number of economic variables. To put this in other terms, one should take into account more than one multiplier when evaluating the relative benefits of alternative expansions. And while Industry G may have a higher labor income multiplier, Industry H may have a higher employment multiplier.

The second fallacy is that a consideration only of industry multipliers neglects the relative costs of proposed developments. It may well be that Industry G has consistently higher income and employment multipliers than Industry H, but that the cost of promoting the regional expansion of G--in terms of public investment, tax incentives, and the like--is prohibitive.

In general, the decision to promote one industry and not others is a complicated choice involving the assessment of both benefits and costs of all possible alternatives. Individual input-output multipliers enter into this decision as only one of many criteria.

6. Multipliers, and impact assessments, represent only estimates of the anticipated economic effects of some external change. A multiplier analysis is a forecasting exercise, and forecasts are often wrong. As apparent from the previous discussion, inaccuracies in impact statements will occur for a number of reasons: the misuse of input-output models; model misspecification; incorrect projections of the direct impact; measurement errors in the base-year coefficient estimates; and outdated input-output coefficients. The first reason is inexcusable, while the last four are unavoidable. It is most reasonable to express the impact in the context of range between two numbers.

However, given problems such as model specification, the degree of uncertainty is not always measurable or even apparent. Nevertheless, the analysts should bear in mind that future economic behavior is never certain, and that multipliers as indicators of that behavior are only estimates.

A Technical Note on Approximating The Leontief Inverse By Means of Power Series

The expression $(I-A)^{-1}$ provides an exact solution to finding the direct and indirect impacts of the inverse of the (A) matrix (direct coefficient matrix). Miernyk (See Miernyk, 144-146: 1965) presents an example to illustrate the approximation of the inverse by means of power series expansion. The usefulness of the power series method is that it permits the user to observe the multiple impacts of expanding a matrix to obtain a table of direct and indirect requirements per dollar of final consumption. The matrix $(I-A)^{-1}$ can be approximated by the following series:

$$F(x) = I + A + A^2 + A^3 \ldots + An$$

The above expression is a polynomial of degree N and will converge if $(0 \leq A < 1)$.

As (A) is carried to successively higher powers, the coefficient will become smaller and smaller if (A) meets the constraint defined above. In economic terms, it provides a clearer understanding of the successive impacts of increasing (or decreasing) output by some level. It also provides a means by which we can identify the point where indirect and direct impacts of increasing output in the input-output table becomes negligible. Clearly, this assumes that behavior is linear and that perturbations do not occur in the system to disturb iterations in the series. Mierynk suggests that Moore and Peterson conceptualized each term in the Power series as the interaction between changes in final demand and the transactions required to satisfy these changes in the process of production.

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APPENDIX

Table 4

INPUT/OUTPUT SECTOR IDENTIFICATION

SECTOR NO.	SECTOR NAME
1	AGRICULTURE, FORESTRY, AND FISHERIES
2	MINING
3	CONSTRUCTION, RESIDENTIAL
4	CONSTRUCTION, NON-RESIDENTIAL
5	CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES
6	MAINTENANCE AND REPAIR
7	ORDNANCE
8	FOOD AND BEVERAGES
9	TEXTILE AND APPAREL PRODUCTS
10	LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES
11	PRINTING AND PUBLISHING
12	CHEMICALS AND ALLIED PRODUCTS
13	PETROLEUM REFINING AND RELATED INDUSTRIES
14	RUBBER AND LEATHER PRODUCTS
15	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS
16	PRIMARY METAL INDUSTRIES
17	FABRICATED METAL PRODUCTS
18	NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS
19	COMPUTERS AND OFFICE EQUIPMENT
20	ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS
21	HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V.,COMMUNICATION
22	ELECTRONIC COMPONENTS AND EQUIPMENT
23	TRANSPORTATION EQUIPMENT
24	PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEOUS MANUFACTURING
25	TRANSPORTATION SERVICES
26	TRUCK TRANSPORTATION
27	COMMUNICATION
28	UTILITIES
29	WHOLESALE TRADE
30	RETAIL TRADE
31	F.I.R.E.
32	HOTELS AND LODGING PLACES
33	PERSONAL AND REPAIR SERVICES
34	BUSINESS AND PROFESSIONAL SERVICES
35	AMUSEMENT AND RECREATION SERVICES
36	HEALTH SERVICES
37	EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFIT ORGANIZATION
38	GOVERNMENT NOT ELSEWHERE CLASSIFIED

Table 4

BAY AREA INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1982

	1	2	3	4	5	6	7	8	9	10
1	0.03170	0.00001	0.00014	0.00015	0.00030	0.00059	0.00000	0.04205	0.00135	0.00283
2	0.00005	0.00279	0.00017	0.00020	0.00057	0.00042	0.00002	0.00003	0.00001	0.00008
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00171	0.00568	0.00021	0.00019	0.00023	0.00013	0.00079	0.00083	0.00025	0.00076
7	0.00003	0.00001	0.00002	0.00008	0.00005	0.00000	0.03338	0.00000	0.00000	0.00000
8	0.03954	0.00004	0.00001	0.00003	0.00002	0.00001	0.00001	0.09474	0.00004	0.00069
9	0.00249	0.00079	0.01239	0.00570	0.00118	0.00370	0.00080	0.00049	0.16636	0.01198
10	0.00150	0.00094	0.07452	0.01664	0.01142	0.01154	0.00178	0.01446	0.00138	0.07193
11	0.00020	0.00025	0.00002	0.00003	0.00003	0.00001	0.00163	0.00580	0.00033	0.00051
12	0.02658	0.00601	0.00813	0.00153	0.00307	0.00724	0.00190	0.00556	0.01718	0.00939
13	0.02653	0.01307	0.01762	0.02315	0.05377	0.02498	0.00367	0.00438	0.00200	0.00987
14	0.00245	0.00213	0.00609	0.00455	0.00227	0.00678	0.00276	0.00577	0.00251	0.00539
15	0.00019	0.00199	0.02497	0.02261	0.02588	0.01212	0.00036	0.00568	0.00018	0.00082
16	0.00002	0.00537	0.00397	0.00552	0.01482	0.00373	0.00926	0.00001	0.00004	0.00146
17	0.00138	0.01115	0.04530	0.08464	0.09055	0.04437	0.00921	0.02571	0.00009	0.00932
18	0.00506	0.02524	0.01390	0.02183	0.00978	0.01038	0.01241	0.00126	0.00142	0.00281
19	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
20	0.00005	0.00240	0.00361	0.00427	0.00256	0.00233	0.00236	0.00000	0.00000	0.00012
21	0.00008	0.00147	0.02603	0.02827	0.03101	0.01795	0.07549	0.00010	0.00021	0.00017
22	0.00715	0.00082	0.00221	0.00344	0.00105	0.00125	0.03545	0.00004	0.00010	0.00021
23	0.00060	0.00037	0.00010	0.00010	0.00018	0.00010	0.00830	0.00001	0.00001	0.00009
24	0.00027	0.00172	0.00766	0.00934	0.00602	0.00522	0.00504	0.00046	0.00407	0.00071
25	0.00410	0.00353	0.00629	0.00408	0.00471	0.00278	0.00375	0.00775	0.00120	0.00709
26	0.00740	0.00675	0.01225	0.01108	0.01891	0.01032	0.00481	0.01253	0.00190	0.00612
27	0.00182	0.00120	0.00306	0.00310	0.00275	0.00269	0.00327	0.00160	0.00170	0.00111
28	0.01000	0.01906	0.00267	0.00271	0.00331	0.00194	0.00894	0.00986	0.00410	0.01112
29	0.04544	0.02129	0.07743	0.04696	0.05300	0.03874	0.01754	0.06980	0.01798	0.03366
30	0.00404	0.00562	0.06872	0.02355	0.01588	0.02988	0.00706	0.00257	0.00144	0.00228
31	0.05874	0.06431	0.00936	0.00946	0.01037	0.00585	0.00662	0.00746	0.00338	0.00568
32	0.00006	0.00011	0.00010	0.00012	0.00010	0.00005	0.00010	0.00007	0.00004	0.00005
33	0.00050	0.00081	0.00031	0.00098	0.00111	0.00027	0.00021	0.00046	0.00016	0.00038
34	0.00537	0.01295	0.02203	0.04209	0.07572	0.00522	0.01310	0.01522	0.00411	0.00594
35	0.00109	0.00008	0.00000	0.00001	0.00001	0.00000	0.00000	0.00002	0.00001	0.00007
36	0.00871	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00047	0.00079	0.00004	0.00001	0.00001	0.00002	0.00039	0.00036	0.00037	0.00062
38	0.00025	0.00044	0.00031	0.00039	0.00062	0.00022	0.00050	0.00120	0.00065	0.00057

Table 4

BAY AREA INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1982

	11	12	13	14	15	16	17	18	19	20
1	0.00000	0.00033	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.00000	0.00111	0.01637	0.00006	0.00235	0.00428	0.00003	0.00001	0.00000	0.00001
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00036	0.00091	0.00086	0.00064	0.00228	0.00279	0.00199	0.00041	0.00014	0.00103
7	0.00000	0.00000	0.00000	0.00000	0.00043	0.00010	0.00000	0.00000	0.00000	0.00000
8	0.00009	0.00347	0.00010	0.00373	0.00027	0.00006	0.00007	0.00003	0.00003	0.00006
9	0.00136	0.00105	0.00015	0.03532	0.00424	0.00057	0.00082	0.00067	0.00002	0.00035
10	0.04395	0.00627	0.00139	0.00750	0.01372	0.00160	0.00559	0.00130	0.00115	0.00591
11	0.05961	0.00144	0.00008	0.00068	0.00115	0.00052	0.00286	0.00054	0.00063	0.00129
12	0.00598	0.09010	0.00981	0.06680	0.01638	0.01531	0.00917	0.00109	0.00075	0.00624
13	0.00313	0.01417	0.04918	0.00779	0.01742	0.01395	0.00490	0.00255	0.00122	0.00699
14	0.00203	0.00583	0.00047	0.02694	0.00263	0.00171	0.00707	0.00343	0.00578	0.00774
15	0.00006	0.00138	0.00041	0.00174	0.03753	0.00232	0.00211	0.00113	0.00016	0.00300
16	0.00012	0.00178	0.00006	0.00148	0.00202	0.06643	0.06847	0.01460	0.00144	0.02746
17	0.00070	0.00868	0.00232	0.00443	0.00654	0.00807	0.05090	0.01226	0.00808	0.01684
18	0.00226	0.00452	0.00076	0.00359	0.00773	0.01802	0.02007	0.05155	0.00185	0.01396
19	0.00004	0.00000	0.00000	0.00000	0.00000	0.00055	0.00000	0.00000	0.24059	0.00173
20	0.00000	0.00008	0.00000	0.00003	0.00027	0.00317	0.00298	0.00728	0.00484	0.03620
21	0.00012	0.00006	0.00005	0.00060	0.00117	0.00023	0.00046	0.00056	0.00107	0.00575
22	0.00017	0.00006	0.00001	0.00070	0.00009	0.00010	0.00042	0.00412	0.07314	0.02387
23	0.00003	0.00001	0.00018	0.00012	0.00047	0.00003	0.00025	0.00082	0.00001	0.00045
24	0.01100	0.00132	0.00025	0.00280	0.00279	0.00212	0.00252	0.00236	0.00105	0.00572
25	0.00716	0.00877	0.01128	0.00577	0.01429	0.01781	0.00670	0.00208	0.00194	0.00646
26	0.00472	0.00978	0.00266	0.00767	0.03371	0.01476	0.00974	0.00296	0.00090	0.00459
27	0.00575	0.00146	0.00083	0.00161	0.00245	0.00113	0.00418	0.00165	0.00132	0.00237
28	0.00404	0.02357	0.01245	0.01068	0.04013	0.04235	0.01291	0.00426	0.00175	0.00981
29	0.02698	0.03270	0.01118	0.02649	0.03417	0.07042	0.05643	0.02951	0.01838	0.06202
30	0.01225	0.00552	0.00181	0.00393	0.00650	0.00269	0.00567	0.00285	0.00310	0.00589
31	0.01383	0.00967	0.00465	0.00883	0.01327	0.00866	0.01318	0.00460	0.00551	0.01641
32	0.00036	0.00010	0.00001	0.00007	0.00005	0.00005	0.00025	0.00005	0.00036	0.00039
33	0.00043	0.00029	0.00009	0.00031	0.00070	0.00035	0.00058	0.00020	0.00008	0.00030
34	0.01674	0.02076	0.00520	0.00877	0.01167	0.00832	0.01335	0.00576	0.00537	0.00983
35	0.00012	0.00007	0.00001	0.00004	0.00003	0.00002	0.00011	0.00004	0.00000	0.00002
36	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00130	0.00129	0.00041	0.00105	0.00076	0.00034	0.00125	0.00037	0.00019	0.00041
38	0.00609	0.00069	0.00035	0.00089	0.00097	0.00074	0.00100	0.00046	0.00032	0.00095

Table 4

BAY AREA INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1982

	21	22	23	24	25	26	27	28	29	30
1	0.00000	0.00000	0.00000	0.00004	0.00001	0.00001	0.00000	0.00001	0.00059	0.00095
2	0.00000	0.00001	0.00001	0.00002	0.00004	0.00000	0.00000	0.00585	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00026	0.00040	0.00025	0.00043	0.00849	0.00173	0.00659	0.00436	0.00141	0.00119
7	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000
8	0.00002	0.00003	0.00001	0.00041	0.00038	0.00007	0.00003	0.00002	0.00108	0.04378
9	0.00066	0.00034	0.01236	0.01024	0.00264	0.00148	0.00088	0.00003	0.00098	0.00052
10	0.00344	0.00155	0.00241	0.00907	0.00034	0.00076	0.00042	0.00032	0.00511	0.00426
11	0.00156	0.00057	0.00035	0.00137	0.00212	0.00229	0.00308	0.00045	0.00821	0.00171
12	0.00313	0.00577	0.00187	0.01163	0.00058	0.00050	0.00076	0.00105	0.00005	0.00054
13	0.00093	0.00194	0.00179	0.00354	0.07865	0.06356	0.00255	0.05763	0.01744	0.01072
14	0.00749	0.00795	0.00929	0.00927	0.00122	0.01050	0.00069	0.00021	0.00260	0.00202
15	0.00145	0.00273	0.00206	0.00129	0.00022	0.00017	0.00009	0.00002	0.00033	0.00033
16	0.00567	0.00806	0.01069	0.00651	0.00092	0.00001	0.00025	0.00003	0.00001	0.00001
17	0.00985	0.01283	0.02928	0.01025	0.00328	0.00142	0.00130	0.00065	0.00109	0.00129
18	0.00381	0.00380	0.01617	0.00326	0.00487	0.00180	0.00220	0.00356	0.00282	0.00130
19	0.00153	0.00000	0.00016	0.00421	0.00011	0.00029	0.00000	0.00010	0.00067	0.00017
20	0.00369	0.00127	0.00083	0.00226	0.00089	0.00054	0.00000	0.00037	0.00000	0.00001
21	0.02330	0.00172	0.01193	0.00131	0.00138	0.00019	0.03149	0.00076	0.00073	0.00049
22	0.10826	0.13478	0.02211	0.04063	0.00165	0.00228	0.02277	0.00013	0.00091	0.00063
23	0.00006	0.00002	0.03618	0.00004	0.00635	0.00148	0.00085	0.00005	0.00051	0.00010
24	0.00673	0.00136	0.00354	0.04354	0.00273	0.00120	0.00545	0.00142	0.00346	0.00365
25	0.00202	0.00362	0.00209	0.00341	0.06936	0.01078	0.00258	0.00793	0.00856	0.00247
26	0.00170	0.00256	0.00298	0.00478	0.00516	0.16670	0.00252	0.00179	0.02246	0.00651
27	0.00130	0.00138	0.00073	0.00314	0.00561	0.00802	0.01645	0.00176	0.01810	0.00768
28	0.00309	0.00515	0.00344	0.00427	0.00888	0.00353	0.00870	0.12586	0.01605	0.02035
29	0.02413	0.02700	0.02496	0.03359	0.01514	0.03038	0.00563	0.00900	0.02422	0.02786
30	0.00269	0.00391	0.00350	0.00474	0.01146	0.01573	0.00645	0.00103	0.04034	0.00542
31	0.00958	0.00719	0.00415	0.00906	0.02243	0.02549	0.03142	0.00794	0.04278	0.05839
32	0.00010	0.00024	0.00012	0.00010	0.00008	0.00010	0.00010	0.00004	0.00054	0.00010
33	0.00028	0.00026	0.00040	0.00043	0.00097	0.00673	0.00063	0.00022	0.00354	0.00136
34	0.00700	0.00607	0.00519	0.01151	0.01915	0.01024	0.01646	0.00342	0.04959	0.03503
35	0.00004	0.00032	0.00012	0.00036	0.00030	0.00002	0.02972	0.00003	0.00384	0.00276
36	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00045	0.00050	0.00050	0.00178	0.00227	0.00070	0.00170	0.00081	0.00180	0.00130
38	0.00079	0.00046	0.00052	0.00099	0.00103	0.00162	0.00259	0.00133	0.00314	0.00282

Table 4

BAY AREA INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1982

	31	32	33	34	35	36	37	38
1	0.00074	0.00090	0.00000	0.00004	0.00329	0.00009	0.00030	0.00079
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00189
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.01254	0.00864	0.00072	0.00094	0.00358	0.00107	0.00630	0.03010
7	0.00000	0.00002	0.00000	0.00073	0.00000	0.00000	0.00001	0.00001
8	0.00001	0.00451	0.00004	0.00038	0.00447	0.00374	0.00568	0.00839
9	0.00037	0.03876	0.00766	0.00055	0.00614	0.00361	0.00264	0.00332
10	0.00071	0.00470	0.00074	0.00226	0.00116	0.00080	0.00449	0.00130
11	0.00713	0.01157	0.00117	0.01880	0.00196	0.00305	0.04259	0.00795
12	0.00034	0.00705	0.00369	0.00244	0.00051	0.01302	0.00149	0.00452
13	0.00286	0.01739	0.00940	0.01146	0.00521	0.00435	0.01112	0.03888
14	0.00055	0.00738	0.00151	0.00183	0.00130	0.00330	0.00137	0.00136
15	0.00003	0.00361	0.00222	0.00014	0.00003	0.00021	0.00035	0.00077
16	0.00000	0.00000	0.00001	0.00001	0.00002	0.00000	0.00002	0.00005
17	0.00027	0.00043	0.01766	0.00193	0.00046	0.00026	0.00137	0.00142
18	0.00013	0.00005	0.00508	0.01006	0.00036	0.00003	0.00014	0.00657
19	0.00128	0.00000	0.02680	0.02675	0.00000	0.00000	0.00098	0.00083
20	0.00000	0.00000	0.00059	0.00063	0.00000	0.00000	0.00000	0.00318
21	0.00059	0.00137	0.00575	0.00215	0.00078	0.00033	0.00277	0.00410
22	0.00090	0.00050	0.01824	0.01612	0.00009	0.00427	0.00432	0.00309
23	0.00005	0.00017	0.01348	0.00080	0.00088	0.00003	0.00013	0.00153
24	0.00241	0.00885	0.01329	0.01887	0.00929	0.01615	0.01244	0.00515
25	0.00185	0.00485	0.00455	0.01133	0.00356	0.00241	0.00679	0.02698
26	0.00130	0.00237	0.00364	0.00416	0.00624	0.00178	0.00575	0.01792
27	0.00862	0.02793	0.00537	0.02562	0.00599	0.00421	0.01046	0.00526
28	0.01025	0.08414	0.00987	0.00926	0.01348	0.00907	0.01848	0.10730
29	0.00267	0.01661	0.04378	0.01581	0.00906	0.01057	0.01246	0.01895
30	0.00852	0.01406	0.01555	0.02313	0.00940	0.00545	0.01346	0.01370
31	0.17689	0.10986	0.02008	0.05512	0.04338	0.03066	0.06657	0.02205
32	0.00022	0.00007	0.00003	0.00129	0.00034	0.00005	0.00070	0.00014
33	0.00034	0.00486	0.00108	0.00211	0.00191	0.00056	0.00161	0.00112
34	0.02597	0.05612	0.01104	0.05838	0.03094	0.01293	0.02413	0.01742
35	0.00001	0.00042	0.00010	0.00130	0.08644	0.00006	0.00409	0.00080
36	0.00462	0.00000	0.00000	0.00000	0.00265	0.04516	0.00086	0.00038
37	0.00090	0.00535	0.00280	0.00717	0.00413	0.00113	0.00374	0.00124
38	0.00594	0.00613	0.00076	0.00722	0.00106	0.00092	0.00641	0.00755

Table 5

INPUT/OUTPUT SECTOR IDENTIFICATION

SECTOR NO.	SECTOR NAME
1	AGRICULTURE, FORESTRY, AND FISHERIES
2	MINING
3	CONSTRUCTION, RESIDENTIAL
4	CONSTRUCTION, NON-RESIDENTIAL
5	CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES
6	MAINTENANCE AND REPAIR
7	ORDNANCE
8	FOOD AND BEVERAGES
9	TEXTILE AND APPAREL PRODUCTS
10	LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES
11	PRINTING AND PUBLISHING
12	CHEMICALS AND ALLIED PRODUCTS
13	PETROLEUM REFINING AND RELATED INDUSTRIES
14	RUBBER AND LEATHER PRODUCTS
15	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS
16	PRIMARY METAL INDUSTRIES
17	FABRICATED METAL PRODUCTS
18	NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS
19	COMPUTERS AND OFFICE EQUIPMENT
20	ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS
21	HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V.,COMMUNICATION
22	ELECTRONIC COMPONENTS AND EQUIPMENT
23	TRANSPORTATION EQUIPMENT
24	PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEOUS MANUFACTURING
25	TRANSPORTATION SERVICES
26	TRUCK TRANSPORTATION
27	COMMUNICATION
28	UTILITIES
29	WHOLESALE TRADE
30	RETAIL TRADE
31	F.I.R.E.
32	HOTELS AND LODGING PLACES
33	PERSONAL AND REPAIR SERVICES
34	BUSINESS AND PROFESSIONAL SERVICES
35	AMUSEMENT AND RECREATION SERVICES
36	HEALTH SERVICES
37	EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFIT ORGANIZATION
38	GOVERNMENT NOT ELSEWHERE CLASSIFIED

Table 5

U.S. INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1977

	1	2	3	4	5	6	7	8	9	10
1	0.24577	0.00009	0.00099	0.00114	0.00186	0.00588	0.00003	0.27563	0.02676	0.03565
2	0.00126	0.06236	0.00376	0.00484	0.01088	0.01316	0.00045	0.00058	0.00046	0.00322
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.01066	0.03281	0.00119	0.00118	0.00114	0.00108	0.00594	0.00437	0.00406	0.00769
7	0.00004	0.00001	0.00003	0.00010	0.00005	0.00001	0.05441	0.00000	0.00000	0.00000
8	0.08760	0.00009	0.00002	0.00007	0.00004	0.00003	0.00003	0.17745	0.00025	0.00250
9	0.00218	0.00064	0.00992	0.00497	0.00081	0.00417	0.00083	0.00036	0.37355	0.01707
10	0.00362	0.00211	0.16483	0.04008	0.02171	0.03593	0.00514	0.02957	0.00854	0.28307
11	0.00021	0.00025	0.00002	0.00003	0.00003	0.00001	0.00206	0.00518	0.00090	0.00088
12	0.05965	0.01248	0.01669	0.00341	0.00541	0.02092	0.00509	0.01055	0.09892	0.03430
13	0.02741	0.01249	0.01665	0.02383	0.04366	0.03322	0.00454	0.00383	0.00531	0.01660
14	0.00512	0.00412	0.01165	0.00948	0.00374	0.01825	0.00689	0.01021	0.01348	0.01835
15	0.00058	0.00576	0.07140	0.07041	0.06358	0.04880	0.00134	0.01502	0.00140	0.00416
16	0.00009	0.02596	0.01898	0.02874	0.06091	0.02514	0.05786	0.00006	0.00050	0.01243
17	0.00215	0.01602	0.06440	0.13101	0.11061	0.08879	0.01712	0.03378	0.00036	0.02357
18	0.00730	0.03364	0.01832	0.03133	0.01108	0.01926	0.02138	0.00154	0.00525	0.00659
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
20	0.00011	0.00445	0.00660	0.00850	0.00402	0.00601	0.00564	0.00000	0.00000	0.00038
21	0.00007	0.00117	0.02041	0.02414	0.02089	0.01981	0.07737	0.00007	0.00045	0.00023
22	0.00297	0.00032	0.00084	0.00143	0.00034	0.00067	0.01761	0.00001	0.00011	0.00014
23	0.00221	0.00127	0.00033	0.00038	0.00052	0.00049	0.03677	0.00004	0.00005	0.00052
24	0.00019	0.00111	0.00490	0.00651	0.00331	0.00470	0.00421	0.00027	0.00731	0.00081
25	0.00678	0.00541	0.00952	0.00672	0.00612	0.00592	0.00741	0.01085	0.00510	0.01908
26	0.00810	0.00683	0.01226	0.01208	0.01627	0.01455	0.00630	0.01160	0.00532	0.01090
27	0.00249	0.00152	0.00382	0.00422	0.00295	0.00473	0.00533	0.00185	0.00593	0.00245
28	0.01251	0.02207	0.00306	0.00338	0.00325	0.00313	0.01338	0.01043	0.01315	0.02265
29	0.03948	0.01711	0.06153	0.04063	0.03619	0.04334	0.01822	0.05127	0.04008	0.04759
30	0.00449	0.00577	0.06983	0.02606	0.01387	0.04274	0.00938	0.00242	0.00410	0.00412
31	0.06815	0.06901	0.00994	0.01093	0.00946	0.00874	0.00919	0.00732	0.01006	0.01072
32	0.00054	0.00095	0.00090	0.00119	0.00076	0.00056	0.00110	0.00057	0.00090	0.00082
33	0.00408	0.00604	0.00231	0.00791	0.00707	0.00284	0.00206	0.00311	0.00328	0.00498
34	0.01117	0.02492	0.04191	0.08721	0.12380	0.01398	0.03259	0.02677	0.02193	0.02010
35	0.00141	0.00009	0.00000	0.00001	0.00001	0.00000	0.00000	0.00002	0.00002	0.00016
36	0.00276	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00044	0.00068	0.00003	0.00001	0.00001	0.00003	0.00043	0.00029	0.00089	0.00094
38	0.00045	0.00075	0.00052	0.00071	0.00090	0.00053	0.00109	0.00186	0.00305	0.00170

Table 5

U.S. INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1977

	11	12	13	14	15	16	17	18	19	20
1	0.00000	0.00355	0.00000	0.00001	0.00011	0.00001	0.00001	0.00001	0.00001	0.00003
2	0.00005	0.03678	0.60951	0.00218	0.05769	0.08565	0.00059	0.00029	0.00001	0.00017
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00348	0.00779	0.00828	0.00559	0.01450	0.01449	0.01003	0.00478	0.00271	0.00656
7	0.00000	0.00000	0.00000	0.00001	0.00060	0.00011	0.00000	0.00000	0.00000	0.00000
8	0.00030	0.01053	0.00036	0.01149	0.00061	0.00010	0.00012	0.00014	0.00018	0.00015
9	0.00183	0.00125	0.00021	0.04301	0.00377	0.00041	0.00058	0.00110	0.00005	0.00031
10	0.16351	0.02077	0.00518	0.02524	0.03367	0.00322	0.01092	0.00595	0.00848	0.01455
11	0.09681	0.00208	0.00012	0.00100	0.00123	0.00046	0.00244	0.00108	0.00203	0.00138
12	0.02063	0.27683	0.03399	0.20859	0.03733	0.02851	0.01661	0.00461	0.00515	0.01425
13	0.00498	0.02004	0.07841	0.01120	0.01828	0.01195	0.00408	0.00496	0.00388	0.00736
14	0.00655	0.01670	0.00152	0.07840	0.00558	0.00296	0.01193	0.01353	0.03701	0.01648
15	0.00028	0.00589	0.00199	0.00755	0.11912	0.00603	0.00533	0.00664	0.00156	0.00955
16	0.00098	0.01274	0.00045	0.01074	0.01071	0.28820	0.28906	0.14407	0.02304	0.14617
17	0.00168	0.01848	0.00556	0.00958	0.01031	0.01041	0.06387	0.03595	0.03846	0.02664
18	0.00502	0.00891	0.00169	0.00719	0.01131	0.02154	0.02336	0.14014	0.00816	0.02049
19	0.00001	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	0.00000	0.16169	0.00039
20	0.00000	0.00021	0.00000	0.00008	0.00055	0.00526	0.00481	0.02747	0.02964	0.07370
21	0.00016	0.00007	0.00007	0.00072	0.00102	0.00016	0.00032	0.00091	0.00282	0.00502
22	0.00011	0.00003	0.00001	0.00040	0.00004	0.00003	0.00014	0.00323	0.09309	0.01010
23	0.00017	0.00006	0.00103	0.00060	0.00178	0.00008	0.00075	0.00571	0.00012	0.00171
24	0.01184	0.00126	0.00028	0.00273	0.00198	0.00123	0.00142	0.00311	0.00224	0.00407
25	0.01823	0.01985	0.02879	0.01327	0.02401	0.02444	0.00895	0.00651	0.00982	0.01088
26	0.00795	0.01465	0.00450	0.01169	0.03746	0.01340	0.00861	0.00611	0.00302	0.00511
27	0.01205	0.00273	0.00175	0.00306	0.00339	0.00128	0.00460	0.00425	0.00552	0.00329
28	0.00778	0.04039	0.02404	0.01860	0.05099	0.04398	0.01305	0.01006	0.00669	0.01250
29	0.03606	0.03889	0.01499	0.03202	0.03014	0.05076	0.03959	0.04836	0.04892	0.05486
30	0.02093	0.00840	0.00311	0.00608	0.00733	0.00248	0.00508	0.00598	0.01056	0.00666
31	0.02469	0.01536	0.00832	0.01425	0.01563	0.00834	0.01235	0.01007	0.01959	0.01938
32	0.00526	0.00132	0.00011	0.00090	0.00047	0.00043	0.00191	0.00087	0.01049	0.00384
33	0.00534	0.00320	0.00112	0.00354	0.00574	0.00236	0.00380	0.00300	0.00198	0.00250
34	0.05356	0.05912	0.01671	0.02538	0.02465	0.01436	0.02241	0.02260	0.03421	0.02082
35	0.00024	0.00012	0.00001	0.00006	0.00003	0.00002	0.00012	0.00009	0.00001	0.00002
36	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00186	0.00164	0.00058	0.00136	0.00072	0.00026	0.00094	0.00064	0.00055	0.00039
38	0.01719	0.00173	0.00100	0.00227	0.00181	0.00113	0.00148	0.00158	0.00182	0.00177

Table 5

U.S. INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1977

	21	22	23	24	25	26	27	28	29	30
1	0.00001	0.00002	0.00001	0.00056	0.00009	0.00003	0.00001	0.00007	0.00325	0.00678
2	0.00019	0.00060	0.00030	0.00073	0.00105	0.00000	0.00000	0.18194	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00377	0.00525	0.00268	0.00446	0.05419	0.00790	0.03190	0.03515	0.00623	0.00682
7	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	0.00000	0.00000	0.00001	0.00001
8	0.00011	0.00014	0.00005	0.00150	0.00086	0.00011	0.00006	0.00005	0.00170	0.08903
9	0.00135	0.00062	0.01841	0.01487	0.00236	0.00095	0.00060	0.00004	0.00061	0.00042
10	0.01951	0.00792	0.00991	0.03638	0.00084	0.00133	0.00079	0.00100	0.00876	0.00946
11	0.00387	0.00128	0.00063	0.00239	0.00228	0.00176	0.00252	0.00061	0.00614	0.00165
12	0.01649	0.02736	0.00713	0.04330	0.00133	0.00082	0.00133	0.00304	0.00008	0.00110
13	0.00226	0.00423	0.00315	0.00606	0.08300	0.04794	0.00204	0.07670	0.01276	0.01016
14	0.03673	0.03516	0.03306	0.03218	0.00260	0.01603	0.00111	0.00058	0.00386	0.00388
15	0.01066	0.01803	0.01095	0.00671	0.00070	0.00039	0.00023	0.00008	0.00073	0.00095
16	0.06954	0.08910	0.09507	0.05649	0.00489	0.00005	0.00102	0.00018	0.00004	0.00004
17	0.03590	0.04215	0.07742	0.02643	0.00521	0.00162	0.00157	0.00130	0.00120	0.00185
18	0.01286	0.01158	0.03965	0.00779	0.00717	0.00189	0.00245	0.00661	0.00288	0.00171
19	0.00079	0.00000	0.00006	0.00153	0.00003	0.00005	0.00000	0.00003	0.00010	0.00003
20	0.01730	0.00536	0.00283	0.00751	0.00181	0.00080	0.00000	0.00095	0.00000	0.00001
21	0.04682	0.00311	0.01741	0.00187	0.00121	0.00012	0.02090	0.00084	0.00045	0.00039
22	0.10548	0.11839	0.01563	0.02801	0.00070	0.00069	0.00733	0.00007	0.00027	0.00024
23	0.00055	0.00015	0.22818	0.00027	0.02402	0.00400	0.00245	0.00026	0.00135	0.00032
24	0.01103	0.00202	0.00421	0.05052	0.00195	0.00061	0.00295	0.00128	0.00172	0.00234
25	0.00783	0.01266	0.00589	0.00937	0.11720	0.01302	0.00330	0.01691	0.01003	0.00375
26	0.00437	0.00592	0.00554	0.00868	0.00577	0.13319	0.00214	0.00252	0.01741	0.00654
27	0.00414	0.00399	0.00170	0.00710	0.00781	0.00798	0.01736	0.00309	0.01748	0.00961
28	0.00906	0.01361	0.00733	0.00887	0.01134	0.00322	0.00844	0.20291	0.01423	0.02338
29	0.04915	0.04959	0.03690	0.04841	0.01343	0.01927	0.00379	0.01007	0.01491	0.02222
30	0.00699	0.00919	0.00661	0.00873	0.01301	0.01276	0.00555	0.00147	0.03175	0.00553
31	0.02606	0.01763	0.00818	0.01743	0.02658	0.02159	0.02823	0.01187	0.03517	0.06218
32	0.00235	0.00488	0.00197	0.00155	0.00075	0.00073	0.00073	0.00052	0.00364	0.00089
33	0.00525	0.00452	0.00551	0.00577	0.00801	0.03972	0.00393	0.00231	0.02027	0.01011
34	0.03413	0.02669	0.01837	0.03972	0.04069	0.01554	0.02652	0.00917	0.07308	0.06688
35	0.00012	0.00087	0.00027	0.00078	0.00039	0.00002	0.02976	0.00006	0.00352	0.00327
36	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00097	0.00098	0.00079	0.00274	0.00216	0.00048	0.00122	0.00097	0.00118	0.00111
38	0.00339	0.00179	0.00161	0.00302	0.00193	0.00218	0.00368	0.00314	0.00409	0.00476

Table 5

U.S. INPUT/OUTPUT INTERMEDIATE INDUSTRY FLOW TABLE-1977

	31	32	33	34	35	36	37	38
1	0.00365	0.00420	0.00001	0.00017	0.03098	0.00114	0.00262	0.00382
2	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00031	0.02824
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.04996	0.03240	0.00613	0.00343	0.02713	0.01090	0.04365	0.11675
7	0.00000	0.00001	0.00000	0.00058	0.00000	0.00001	0.00001	0.00001
8	0.00002	0.00600	0.00011	0.00049	0.01202	0.01353	0.01395	0.01153
9	0.00021	0.02035	0.00912	0.00028	0.00652	0.00517	0.00256	0.00180
10	0.00109	0.00682	0.00243	0.00317	0.00341	0.00318	0.01203	0.00196
11	0.00480	0.00732	0.00168	0.01155	0.00251	0.00526	0.04984	0.00521
12	0.00048	0.00949	0.01125	0.00319	0.00140	0.04770	0.00370	0.00629
13	0.00188	0.01077	0.01320	0.00689	0.00653	0.00734	0.01273	0.02492
14	0.00073	0.00925	0.00430	0.00223	0.00329	0.01125	0.00318	0.00176
15	0.00006	0.00677	0.00943	0.00025	0.00010	0.00109	0.00121	0.00149
16	0.00000	0.00000	0.00010	0.00002	0.00013	0.00001	0.00011	0.00016
17	0.00027	0.00040	0.03731	0.00174	0.00086	0.00066	0.00237	0.00137
18	0.00012	0.00005	0.00995	0.00844	0.00063	0.00007	0.00023	0.00587
19	0.00018	0.00000	0.00800	0.00342	0.00000	0.00000	0.00024	0.00011
20	0.00000	0.00000	0.00160	0.00073	0.00000	0.00000	0.00000	0.00394
21	0.00032	0.00071	0.00671	0.00108	0.00081	0.00046	0.00263	0.00218
22	0.00024	0.00013	0.01031	0.00390	0.00004	0.00290	0.00199	0.00080
23	0.00013	0.00037	0.06796	0.00173	0.00396	0.00019	0.00052	0.00351
24	0.00107	0.00371	0.01264	0.00768	0.00788	0.01844	0.00965	0.00224
25	0.00195	0.00481	0.01023	0.01091	0.00714	0.00651	0.01245	0.02770
26	0.00091	0.00156	0.00542	0.00265	0.00828	0.00318	0.00698	0.01217
27	0.00749	0.02283	0.00996	0.02033	0.00990	0.00936	0.01580	0.00445
28	0.00818	0.06314	0.01679	0.00674	0.02047	0.01853	0.02563	0.08333
29	0.00148	0.00865	0.05171	0.00800	0.00955	0.01499	0.01200	0.01022
30	0.00604	0.00936	0.02349	0.01496	0.01267	0.00989	0.01658	0.00944
31	0.13080	0.07642	0.03167	0.03723	0.06104	0.05806	0.08561	0.01588
32	0.00133	0.00038	0.00041	0.00719	0.00399	0.00077	0.00740	0.00082
33	0.00175	0.02357	0.01192	0.00992	0.01874	0.00733	0.01448	0.00563
34	0.03443	0.07000	0.03123	0.07069	0.07805	0.04391	0.05564	0.02249
35	0.00001	0.00032	0.00017	0.00098	0.13554	0.00013	0.00587	0.00064
36	0.00093	0.00000	0.00000	0.00000	0.00102	0.02332	0.00030	0.00008
37	0.00053	0.00298	0.00354	0.00388	0.00465	0.00171	0.00385	0.00072
38	0.00695	0.00674	0.00190	0.00771	0.00237	0.00275	0.01303	0.00860

Table 6
INPUT/OUTPUT SECTOR IDENTIFICATION

SECTOR NO.	SECTOR NAME
1	AGRICULTURE, FORESTRY, AND FISHERIES
2	MINING
3	CONSTRUCTION, RESIDENTIAL
4	CONSTRUCTION, NON-RESIDENTIAL
5	CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES
6	MAINTENANCE AND REPAIR
7	ORDNANCE
8	FOOD AND BEVERAGES
9	TEXTILE AND APPAREL PRODUCTS
10	LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES
11	PRINTING AND PUBLISHING
12	CHEMICALS AND ALLIED PRODUCTS
13	PETROLEUM REFINING AND RELATED INDUSTRIES
14	RUBBER AND LEATHER PRODUCTS
15	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS
16	PRIMARY METAL INDUSTRIES
17	FABRICATED METAL PRODUCTS
18	NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS
19	COMPUTERS AND OFFICE EQUIPMENT
20	ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS
21	HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V.,COMMUNICATION
22	ELECTRONIC COMPONENTS AND EQUIPMENT
23	TRANSPORTATION EQUIPMENT
24	PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEOUS MANUFACTURING
25	TRANSPORTATION SERVICES
26	TRUCK TRANSPORTATION
27	COMMUNICATION
28	UTILITIES
29	WHOLESALE TRADE
30	RETAIL TRADE
31	F.I.R.E.
32	HOTELS AND LODGING PLACES
33	PERSONAL AND REPAIR SERVICES
34	BUSINESS AND PROFESSIONAL SERVICES
35	AMUSEMENT AND RECREATION SERVICES
36	HEALTH SERVICES
37	EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFIT ORGANIZATION
38	GOVERNMENT NOT ELSEWHERE CLASSIFIED

Table 6

BAY AREA DIRECT AND INDIRECT ECONOMIC IMPACT FLOW TABLE-1982

	1	2	3	4	5	6	7	8	9	10
1	1.03487	0.00015	0.00075	0.00039	0.00053	0.00082	0.00009	0.04823	0.00173	0.00328
2	0.00076	1.00331	0.00082	0.00090	0.00190	0.00106	0.00029	0.00040	0.00016	0.00047
3	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00326	0.00716	0.00145	0.00130	0.00158	1.00086	0.00142	0.00191	0.00061	0.00135
7	0.00004	0.00003	0.00007	0.00013	0.00014	0.00002	1.03454	0.00003	0.00001	0.00001
8	0.04591	0.00060	0.00404	0.00170	0.00142	0.00185	0.00062	1.10742	0.00046	0.00138
9	0.00369	0.00141	0.01712	0.00812	0.00259	0.00542	0.00171	0.00178	1.19992	0.01599
10	0.00339	0.00186	0.08271	0.02016	0.01479	0.01389	0.00313	0.01889	0.00229	1.07823
11	0.00215	0.00177	0.00246	0.00250	0.00339	0.00123	0.00290	0.00863	0.00099	0.00147
12	0.03172	0.00773	0.01279	0.00513	0.00724	0.01037	0.00391	0.00987	0.02320	0.01250
13	0.03395	0.01836	0.02715	0.03102	0.06493	0.03095	0.00759	0.01298	0.00462	0.01525
14	0.00374	0.00294	0.00859	0.00679	0.00464	0.00830	0.00466	0.00778	0.00349	0.00654
15	0.00067	0.00233	0.02643	0.02400	0.02743	0.01292	0.00084	0.00676	0.00030	0.00105
16	0.00062	0.00737	0.00892	0.01367	0.02386	0.00813	0.01267	0.00249	0.00024	0.00266
17	0.00383	0.01307	0.05046	0.09131	0.09763	0.04813	0.01268	0.03098	0.00062	0.01117
18	0.00650	0.02785	0.01774	0.02684	0.01495	0.01302	0.01532	0.00346	0.00223	0.00407
19	0.00076	0.00093	0.00159	0.00220	0.00351	0.00063	0.00096	0.00110	0.00036	0.00048
20	0.00019	0.00286	0.00429	0.00520	0.00344	0.00283	0.00317	0.00021	0.00006	0.00025
21	0.00052	0.00198	0.02733	0.02963	0.03255	0.01877	0.08052	0.00056	0.00044	0.00043
22	0.00949	0.00231	0.00804	0.01021	0.00844	0.00488	0.05387	0.00162	0.00081	0.00090
23	0.00079	0.00053	0.00038	0.00038	0.00053	0.00027	0.00903	0.00027	0.00006	0.00024
24	0.00151	0.00292	0.01032	0.01217	0.00949	0.00662	0.00697	0.00194	0.00552	0.00152
25	0.00709	0.00564	0.01112	0.00834	0.01031	0.00551	0.00602	0.01204	0.00243	0.00964
26	0.01257	0.01013	0.02134	0.01869	0.02888	0.01600	0.00808	0.02103	0.00397	0.00989
27	0.00458	0.00344	0.00754	0.00713	0.00800	0.00498	0.00514	0.00505	0.00298	0.00274
28	0.01688	0.02557	0.01260	0.01084	0.01322	0.00754	0.01398	0.01777	0.00743	0.01635
29	0.05586	0.02711	0.09447	0.06245	0.07035	0.04866	0.02678	0.08753	0.02419	0.04079
30	0.00855	0.00884	0.07578	0.02945	0.02326	0.03361	0.01010	0.00859	0.00336	0.00516
31	0.08124	0.08375	0.02892	0.02529	0.02971	0.01609	0.01489	0.02326	0.00805	0.01261
32	0.00014	0.00018	0.00025	0.00028	0.00031	0.00012	0.00018	0.00019	0.00008	0.00011
33	0.00095	0.00111	0.00112	0.00163	0.00194	0.00071	0.00051	0.00112	0.00035	0.00070
34	0.01405	0.01929	0.03564	0.05342	0.08994	0.01221	0.01880	0.02576	0.00782	0.01080
35	0.00168	0.00038	0.00096	0.00070	0.00080	0.00051	0.00037	0.00070	0.00024	0.00040
36	0.00984	0.00041	0.00015	0.00013	0.00015	0.00009	0.00007	0.00056	0.00006	0.00009
37	0.00094	0.00119	0.00090	0.00087	0.00118	0.00045	0.00078	0.00098	0.00064	0.00095
38	0.00125	0.00135	0.00159	0.00153	0.00212	0.00087	0.00108	0.00220	0.00104	0.00104

Table 6

BAY AREA DIRECT AND INDIRECT ECONOMIC IMPACT FLOW TABLE-1982

	11	12	13	14	15	16	17	18	19	20
1	0.00027	0.00067	0.00005	0.00038	0.00019	0.00013	0.00015	0.00007	0.00007	0.00015
2	0.00021	0.00181	0.01743	0.00050	0.00327	0.00538	0.00074	0.00023	0.00013	0.00049
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00128	0.00179	0.00141	0.00133	0.00345	0.00409	0.00319	0.00086	0.00065	0.00205
7	0.00002	0.00002	0.00001	0.00002	0.00048	0.00012	0.00003	0.00001	0.00001	0.00002
8	0.00112	0.00485	0.00037	0.00498	0.00105	0.00071	0.00085	0.00040	0.00048	0.00083
9	0.00299	0.00208	0.00041	0.04405	0.00608	0.00132	0.00194	0.00126	0.00068	0.00139
10	0.05109	0.00832	0.00191	0.00954	0.01632	0.00303	0.00767	0.00214	0.00244	0.00792
11	1.06468	0.00308	0.00058	0.00185	0.00259	0.00214	0.00482	0.00137	0.00171	0.00298
12	0.00829	1.10043	0.01174	0.07700	0.02009	0.01912	0.01323	0.00238	0.00295	0.00939
13	0.00777	0.02223	1.05514	0.01360	0.02883	0.02530	0.01259	0.00551	0.00410	0.01325
14	0.00308	0.00726	0.00083	1.02881	0.00399	0.00291	0.00866	0.00427	0.00917	0.00947
15	0.00022	0.00174	0.00056	0.00210	1.03921	0.00282	0.00270	0.00141	0.00067	0.00361
16	0.00058	0.00311	0.00049	0.00241	0.00323	1.07256	0.07806	0.01792	0.00430	0.03273
17	0.00194	0.01091	0.00317	0.00620	0.00842	0.01047	1.05553	0.01435	0.01325	0.02016
18	0.00345	0.00641	0.00177	0.00506	0.00984	0.02187	0.02482	1.05554	0.00387	0.01731
19	0.00108	0.00115	0.00033	0.00065	0.00085	0.00157	0.00104	0.00047	1.31732	0.00323
20	0.00014	0.00026	0.00011	0.00016	0.00053	0.00384	0.00379	0.00812	0.00688	1.03801
21	0.00063	0.00043	0.00025	0.00092	0.00174	0.00075	0.00106	0.00089	0.00190	0.00660
22	0.00187	0.00122	0.00042	0.00176	0.00148	0.00145	0.00201	0.00595	0.11231	0.03088
23	0.00020	0.00020	0.00033	0.00026	0.00079	0.00033	0.00049	0.00098	0.00010	0.00068
24	0.01325	0.00266	0.00071	0.00402	0.00414	0.00357	0.00419	0.00324	0.00224	0.00747
25	0.01001	0.01235	0.01352	0.00853	0.01863	0.02318	0.01119	0.00374	0.00421	0.00998
26	0.00823	0.01513	0.00439	0.01219	0.04454	0.02259	0.01676	0.00567	0.00332	0.00965
27	0.00818	0.00385	0.00171	0.00343	0.00497	0.00411	0.00724	0.00308	0.00320	0.00521
28	0.00888	0.03276	0.01670	0.01719	0.05165	0.05629	0.02320	0.00793	0.00542	0.01739
29	0.03434	0.04139	0.01421	0.03456	0.04284	0.08304	0.07131	0.03612	0.03101	0.07420
30	0.01606	0.00947	0.00331	0.00707	0.01076	0.00816	0.01087	0.00533	0.00662	0.01091
31	0.02461	0.02011	0.00993	0.01711	0.02505	0.02096	0.02624	0.01030	0.01391	0.02947
32	0.00045	0.00019	0.00004	0.00013	0.00012	0.00015	0.00035	0.00010	0.00054	0.00050
33	0.00078	0.00070	0.00024	0.00064	0.00131	0.00095	0.00113	0.00044	0.00034	0.00079
34	0.02358	0.02878	0.00806	0.01505	0.01867	0.01700	0.02223	0.00985	0.01138	0.01814
35	0.00066	0.00047	0.00016	0.00036	0.00046	0.00058	0.00076	0.00034	0.00032	0.00059
36	0.00013	0.00011	0.00005	0.00009	0.00013	0.00011	0.00013	0.00005	0.00007	0.00015
37	0.00181	0.00187	0.00062	0.00149	0.00126	0.00088	0.00183	0.00062	0.00055	0.00091
38	0.00714	0.00143	0.00063	0.00146	0.00173	0.00157	0.00189	0.00085	0.00085	0.00177

Table 6

BAY AREA DIRECT AND INDIRECT ECONOMIC IMPACT FLOW TABLE-1982

	21	22	23	24	25	26	27	28	29	30
1	0.00008	0.00008	0.00009	0.00021	0.00015	0.00017	0.00021	0.00005	0.00093	0.00325
2	0.00016	0.00023	0.00021	0.00026	0.00167	0.00145	0.00019	0.00791	0.00057	0.00045
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00082	0.00098	0.00075	0.00109	0.00999	0.00322	0.00771	0.00551	0.00301	0.00278
7	0.00001	0.00001	0.00001	0.00002	0.00003	0.00002	0.00002	0.00001	0.00006	0.00004
8	0.00044	0.00053	0.00046	0.00109	0.00130	0.00138	0.00074	0.00022	0.00362	0.04913
9	0.00159	0.00115	0.01617	0.01373	0.00390	0.00312	0.00172	0.00026	0.00196	0.00122
10	0.00478	0.00268	0.00362	0.01121	0.00134	0.00203	0.00136	0.00083	0.00698	0.00622
11	0.00262	0.00156	0.00124	0.00271	0.00370	0.00429	0.00457	0.00104	0.01120	0.00418
12	0.00572	0.00875	0.00437	0.01546	0.00240	0.00302	0.00181	0.00238	0.00136	0.00192
13	0.00381	0.00544	0.00489	0.00763	0.09218	0.08432	0.00569	0.07148	0.02544	0.01646
14	0.00948	0.00998	0.01095	0.01110	0.00202	0.01351	0.00168	0.00056	0.00368	0.00299
15	0.00206	0.00344	0.00253	0.00173	0.00052	0.00043	0.00040	0.00018	0.00053	0.00076
16	0.00862	0.01141	0.01507	0.00895	0.00180	0.00048	0.00114	0.00036	0.00041	0.00042
17	0.01306	0.01628	0.03332	0.01285	0.00517	0.00295	0.00295	0.00157	0.00228	0.00342
18	0.00560	0.00572	0.01931	0.00496	0.00661	0.00325	0.00329	0.00492	0.00436	0.00249
19	0.00263	0.00051	0.00071	0.00655	0.00125	0.00157	0.00102	0.00045	0.00335	0.00204
20	0.00426	0.00170	0.00132	0.00271	0.00116	0.00080	0.00029	0.00055	0.00019	0.00014
21	1.02434	0.00229	0.01296	0.00186	0.00223	0.00096	0.03322	0.00118	0.00188	0.00118
22	0.12934	1.15671	0.02892	0.05066	0.00375	0.00468	0.03201	0.00080	0.00398	0.00270
23	0.00016	0.00013	1.03764	0.00017	0.00720	0.00215	0.00102	0.00019	0.00083	0.00027
24	0.00807	0.00235	0.00472	1.04658	0.00421	0.00272	0.00728	0.00213	0.00589	0.00544
25	0.00398	0.00589	0.00399	0.00574	1.07689	0.01624	0.00417	0.01112	0.01188	0.00508
26	0.00431	0.00561	0.00604	0.00851	0.00842	1.20246	0.00452	0.00350	0.02940	0.01057
27	0.00291	0.00306	0.00224	0.00524	0.00801	0.01203	1.01850	0.00285	0.02212	0.01082
28	0.00697	0.00974	0.00747	0.00889	0.01466	0.00939	0.01308	1.14633	0.02349	0.02760
29	0.03271	0.03606	0.03340	0.04228	0.02142	0.04203	0.01054	0.01299	1.03131	0.03584
30	0.00556	0.00698	0.00616	0.00821	0.01518	0.02250	0.00909	0.00265	0.04520	1.00950
31	0.01738	0.01484	0.01033	0.01800	0.03557	0.04486	0.04512	0.01429	0.06478	0.07928
32	0.00019	0.00033	0.00018	0.00018	0.00015	0.00020	0.00018	0.00007	0.00067	0.00021
33	0.00054	0.00055	0.00067	0.00078	0.00131	0.00839	0.00089	0.00038	0.00414	0.00177
34	0.01195	0.01124	0.00975	0.01771	0.02608	0.01915	0.02224	0.00646	0.05998	0.04372
35	0.00037	0.00070	0.00041	0.00085	0.00081	0.00071	0.03327	0.00022	0.00531	0.00364
36	0.00009	0.00008	0.00005	0.00009	0.00018	0.00022	0.00032	0.00007	0.00034	0.00043
37	0.00079	0.00085	0.00082	0.00225	0.00285	0.00130	0.00221	0.00111	0.00262	0.00191
38	0.00129	0.00095	0.00095	0.00161	0.00180	0.00274	0.00332	0.00180	0.00451	0.00400

Table 6

BAY AREA DIRECT AND INDIRECT ECONOMIC IMPACT FLOW TABLE-1982

	31	32	33	34	35	36	37	38
1	0.00101	0.00147	0.00016	0.00028	0.00410	0.00038	0.00080	0.00139
2	0.00024	0.00113	0.00035	0.00042	0.00029	0.00023	0.00047	0.00361
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.01584	0.01176	0.00161	0.00291	0.00516	0.00195	0.00816	0.03198
7	0.00003	0.00007	0.00002	0.00080	0.00003	0.00002	0.00004	0.00003
8	0.00083	0.00630	0.00115	0.00207	0.00637	0.00486	0.00738	0.01044
9	0.00093	0.04762	0.01001	0.00165	0.00862	0.00513	0.00401	0.00479
10	0.00196	0.00717	0.00202	0.00465	0.00229	0.00181	0.00798	0.00323
11	0.01030	0.01574	0.00275	0.02301	0.00415	0.00446	0.04732	0.01004
12	0.00126	0.01077	0.00556	0.00436	0.00177	0.01599	0.00317	0.00696
13	0.00690	0.02923	0.01410	0.01786	0.01010	0.00748	0.01707	0.05588
14	0.00117	0.00870	0.00295	0.00328	0.00212	0.00415	0.00234	0.00265
15	0.00030	0.00411	0.00260	0.00043	0.00022	0.00039	0.00064	0.00144
16	0.00029	0.00050	0.00230	0.00108	0.00034	0.00035	0.00054	0.00101
17	0.00151	0.00234	0.02055	0.00401	0.00153	0.00118	0.00288	0.00448
18	0.00108	0.00212	0.00699	0.01236	0.00136	0.00068	0.00134	0.00897
19	0.00339	0.00300	0.03620	0.03809	0.00172	0.00086	0.00279	0.00222
20	0.00015	0.00025	0.00106	0.00116	0.00013	0.00010	0.00019	0.00367
21	0.00160	0.00320	0.00664	0.00380	0.00151	0.00074	0.00373	0.00545
22	0.00312	0.00447	0.02686	0.02595	0.00233	0.00683	0.00770	0.00602
23	0.00017	0.00046	0.01414	0.00113	0.00116	0.00012	0.00032	0.00196
24	0.00438	0.01232	0.01515	0.02246	0.01214	0.01849	0.01506	0.00710
25	0.00375	0.00901	0.00685	0.01503	0.00579	0.00390	0.00967	0.03261
26	0.00308	0.00603	0.00714	0.00763	0.00965	0.00355	0.00914	0.02455
27	0.01218	0.03291	0.00784	0.03001	0.00905	0.00594	0.01353	0.00802
28	0.01677	0.10304	0.01520	0.01652	0.01990	0.01330	0.02587	0.12784
29	0.00671	0.02567	0.05158	0.02427	0.01446	0.01486	0.01925	0.02834
30	0.01264	0.01981	0.01949	0.02826	0.01328	0.00774	0.01756	0.01843
31	1.22063	0.14612	0.03251	0.07983	0.06468	0.04312	0.08927	0.03677
32	0.00033	1.00023	0.00013	0.00146	0.00046	0.00010	0.00080	0.00022
33	0.00060	0.00534	1.00146	0.00258	0.00239	0.00076	0.00197	0.00161
34	0.03570	0.06891	0.01809	1.06968	0.04037	0.01796	0.03251	0.02501
35	0.00055	0.00185	0.00071	0.00276	1.09511	0.00040	0.00515	0.00139
36	0.00592	0.00073	0.00016	0.00041	0.00340	1.04751	0.00136	0.00060
37	0.00149	0.00638	0.00326	0.00812	0.00505	0.00151	1.00437	0.00186
38	0.00779	0.00817	0.00151	0.00883	0.00212	0.00156	0.00782	1.00858

Table 7
INPUT/OUTPUT SECTOR IDENTIFICATION

SECTOR NO.	SECTOR NAME
1	AGRICULTURE, FORESTRY, AND FISHERIES
2	MINING
3	CONSTRUCTION, RESIDENTIAL
4	CONSTRUCTION, NON-RESIDENTIAL
5	CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES
6	MAINTENANCE AND REPAIR
7	ORDNANCE
8	FOOD AND BEVERAGES
9	TEXTILE AND APPAREL PRODUCTS
10	LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES
11	PRINTING AND PUBLISHING
12	CHEMICALS AND ALLIED PRODUCTS
13	PETROLEUM REFINING AND RELATED INDUSTRIES
14	RUBBER AND LEATHER PRODUCTS
15	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS
16	PRIMARY METAL INDUSTRIES
17	FABRICATED METAL PRODUCTS
18	NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS
19	COMPUTERS AND OFFICE EQUIPMENT
20	ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS
21	HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V.,COMMUNICATION
22	ELECTRONIC COMPONENTS AND EQUIPMENT
23	TRANSPORTATION EQUIPMENT
24	PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEOUS MANUFACTURING
25	TRANSPORTATION SERVICES
26	TRUCK TRANSPORTATION
27	COMMUNICATION
28	UTILITIES
29	WHOLESALE TRADE
30	RETAIL TRADE
31	F.I.R.E.
32	HOTELS AND LODGING PLACES
33	PERSONAL AND REPAIR SERVICES
34	BUSINESS AND PROFESSIONAL SERVICES
35	AMUSEMENT AND RECREATION SERVICES
36	HEALTH SERVICES
37	EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFIT ORGANIZATION
38	GOVERNMENT NOT ELSEWHERE CLASSIFIED

Table 7

BAY AREA DIRECT, INDIRECT AND INDUCED IMPACT FLOW TABLE-1982

	1	2	3	4	5	6	7	8	9	10
1	1.04743	0.01726	0.01087	0.01316	0.01444	0.01842	0.01013	0.05632	0.00983	0.01193
2	0.00311	1.00651	0.00271	0.00329	0.00451	0.00435	0.00217	0.00191	0.00168	0.00209
3	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.02464	0.03628	0.01867	0.02302	0.02526	1.03081	0.01851	0.01566	0.01440	0.01608
7	0.00075	0.00099	0.00064	0.00085	0.00092	0.00101	1.03511	0.00048	0.00047	0.00050
8	0.11787	0.09863	0.06199	0.07482	0.08114	0.10269	0.05818	1.15372	0.04688	0.05096
9	0.02881	0.03564	0.03736	0.03365	0.03042	0.04062	0.02181	0.01795	1.21613	0.03330
10	0.03001	0.03812	0.10415	0.04720	0.04427	0.05118	0.02442	0.03601	0.01946	1.09656
11	0.03147	0.04171	0.02607	0.03229	0.03587	0.04232	0.02635	0.02750	0.01990	0.02167
12	0.04515	0.02601	0.02361	0.01877	0.02211	0.02918	0.01465	0.01851	0.03186	0.02175
13	0.12527	0.14276	0.10070	0.12381	0.16609	0.15892	0.08064	0.07174	0.06354	0.07817
14	0.01038	0.01198	0.01393	0.01354	0.01200	0.01760	0.00997	0.01205	0.00777	0.01112
15	0.00869	0.01325	0.03288	0.03214	0.03631	0.02415	0.00725	0.01192	0.00547	0.00657
16	0.00197	0.00921	0.01001	0.01504	0.02535	0.01001	0.01374	0.00335	0.00111	0.00359
17	0.01086	0.02265	0.05612	0.09846	0.10542	0.05799	0.01831	0.03551	0.00516	0.01602
18	0.01134	0.03443	0.02163	0.03175	0.02031	0.01979	0.01918	0.00657	0.00534	0.00740
19	0.00649	0.00873	0.00620	0.00803	0.00986	0.00866	0.00554	0.00478	0.00406	0.00443
20	0.00090	0.00382	0.00486	0.00592	0.00422	0.00382	0.00374	0.00067	0.00051	0.00074
21	0.00598	0.00942	0.03173	0.03518	0.03860	0.02643	0.08489	0.00407	0.00396	0.00420
22	0.02045	0.01725	0.01687	0.02135	0.02059	0.02024	0.06264	0.00867	0.00789	0.00846
23	0.00722	0.00929	0.00556	0.00691	0.00765	0.00927	0.01417	0.00441	0.00421	0.00467
24	0.01604	0.02272	0.02203	0.02694	0.02559	0.02699	0.01860	0.01129	0.01490	0.01153
25	0.07156	0.09345	0.06304	0.07384	0.08172	0.09584	0.05758	0.05351	0.04401	0.05405
26	0.03175	0.03624	0.03679	0.03817	0.05012	0.04287	0.02341	0.03336	0.01634	0.02310
27	0.06077	0.07997	0.05279	0.06422	0.07024	0.08371	0.05009	0.04120	0.03923	0.04146
28	0.12738	0.17609	0.10159	0.12313	0.13563	0.16238	0.10238	0.08887	0.07872	0.09249
29	0.18963	0.20932	0.20220	0.19838	0.21852	0.23610	0.13379	0.17359	0.11049	0.13296
30	0.40044	0.54266	0.39138	0.42765	0.45735	0.58274	0.32359	0.26073	0.25618	0.27518
31	0.58366	0.76813	0.43355	0.53580	0.58622	0.72010	0.41679	0.34652	0.33218	0.35879
32	0.00411	0.00558	0.00344	0.00431	0.00470	0.00568	0.00335	0.00274	0.00263	0.00284
33	0.02916	0.03954	0.02385	0.03030	0.03319	0.04025	0.02308	0.01928	0.01855	0.02014
34	0.08305	0.11328	0.09121	0.12353	0.16637	0.10889	0.07400	0.07016	0.05233	0.05834
35	0.02696	0.03481	0.02132	0.02638	0.02880	0.03592	0.02059	0.01696	0.01655	0.01781
36	0.29095	0.38332	0.22654	0.28576	0.31152	0.39398	0.22494	0.18142	0.18140	0.19378
37	0.02755	0.03743	0.02232	0.02791	0.03065	0.03773	0.02207	0.01810	0.01780	0.01929
38	0.03528	0.04770	0.02899	0.03611	0.03981	0.04855	0.02830	0.02409	0.02300	0.02449

Table 7

BAY AREA DIRECT, INDIRECT AND INDUCED IMPACT FLOW TABLE-1982

	11	12	13	14	15	16	17	18	19	20
1	0.01099	0.00682	0.00299	0.01101	0.01140	0.00824	0.00986	0.00832	0.01237	0.01096
2	0.00222	0.00296	0.01798	0.00249	0.00537	0.00690	0.00256	0.00177	0.00243	0.00252
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.01951	0.01226	0.00642	0.01943	0.02253	0.01789	0.01972	0.01490	0.02159	0.02045
7	0.00062	0.00037	0.00017	0.00062	0.00111	0.00058	0.00057	0.00048	0.00070	0.00063
8	0.06251	0.04007	0.01722	0.06591	0.06528	0.04718	0.05650	0.04767	0.07097	0.06276
9	0.02442	0.01438	0.00629	0.06532	0.02851	0.01755	0.02137	0.01776	0.02529	0.02301
10	0.07379	0.02135	0.00814	0.03207	0.04007	0.02021	0.02825	0.01962	0.02851	0.03082
11	1.08969	0.01743	0.00744	0.02667	0.02876	0.02108	0.02749	0.02063	0.03043	0.02821
12	0.01975	1.10700	0.01488	0.08836	0.03207	0.02779	0.02361	0.01120	0.01610	0.02095
13	0.08567	0.06694	1.07652	0.09092	0.11034	0.08428	0.08321	0.06550	0.09356	0.09184
14	0.00875	0.01051	0.00239	1.03443	0.00992	0.00720	0.01380	0.00863	0.01568	0.01519
15	0.00706	0.00567	0.00243	0.00889	1.04636	0.00800	0.00890	0.00668	0.00852	0.01051
16	0.00173	0.00377	0.00080	0.00355	0.00443	1.07343	0.07911	0.01881	0.00562	0.03389
17	0.00794	0.01435	0.00481	0.01216	0.01469	0.01501	1.06097	0.01897	0.02014	0.02621
18	0.00757	0.00878	0.00290	0.00915	0.01415	0.02499	0.02855	1.05871	0.00860	0.02147
19	0.00597	0.00395	0.00168	0.00550	0.00596	0.00527	0.00547	0.00423	1.32293	0.00816
20	0.00074	0.00061	0.00027	0.00076	0.00116	0.00430	0.00434	0.00858	0.00757	1.03861
21	0.00529	0.00310	0.00153	0.00555	0.00662	0.00428	0.00528	0.00448	0.00725	0.01131
22	0.01123	0.00659	0.00299	0.01104	0.01126	0.00853	0.01049	0.01315	0.12305	0.04032
23	0.00568	0.00335	0.00183	0.00570	0.00653	0.00449	0.00546	0.00520	0.00640	0.00621
24	0.02565	0.00977	0.00412	0.01633	0.01711	0.01296	0.01543	0.01279	0.01648	0.01997
25	0.06499	0.04390	0.02861	0.06311	0.07616	0.06481	0.06104	0.04609	0.06735	0.06546
26	0.02458	0.02451	0.00888	0.02842	0.06166	0.03497	0.03159	0.01826	0.02210	0.02615
27	0.05611	0.03135	0.01486	0.05100	0.05511	0.04039	0.05069	0.03999	0.05823	0.05356
28	0.10315	0.08685	0.04256	0.11075	0.15027	0.12766	0.10865	0.08052	0.11367	0.11248
29	0.14844	0.10687	0.04553	0.14781	0.16222	0.16943	0.17475	0.12400	0.16204	0.18932
30	0.35034	0.20130	0.09504	0.33886	0.36051	0.26124	0.31391	0.26277	0.39050	0.34815
31	0.45317	0.26604	0.12754	0.44248	0.47344	0.34541	0.41475	0.34035	0.50606	0.46182
32	0.00383	0.00213	0.00096	0.00349	0.00366	0.00271	0.00342	0.00270	0.00443	0.00392
33	0.02485	0.01451	0.00685	0.02453	0.02649	0.01917	0.02295	0.01898	0.02798	0.02507
34	0.08243	0.06255	0.02421	0.07347	0.08025	0.06156	0.07559	0.05518	0.07897	0.07752
35	0.02222	0.01284	0.00607	0.02176	0.02301	0.01690	0.02030	0.01694	0.02508	0.02234
36	0.23991	0.13771	0.06585	0.23808	0.25100	0.18164	0.21751	0.18471	0.27543	0.24205
37	0.02451	0.01490	0.00685	0.02401	0.02500	0.01806	0.02240	0.01810	0.02661	0.02380
38	0.03616	0.01808	0.00859	0.03027	0.03210	0.02354	0.02820	0.02320	0.03418	0.03105

Table 7

BAY AREA DIRECT, INDIRECT AND INDUCED IMPACT FLOW TABLE-1982

	21	22	23	24	25	26	27	28	29	30
1	0.00986	0.01081	0.01051	0.01128	0.01175	0.01145	0.01106	0.00475	0.01392	0.01566
2	0.00199	0.00224	0.00216	0.00234	0.00384	0.00356	0.00222	0.00879	0.00300	0.00277
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.01746	0.01924	0.01848	0.01994	0.02973	0.02241	0.02616	0.01351	0.02511	0.02389
7	0.00056	0.00062	0.00060	0.00064	0.00068	0.00066	0.00063	0.00027	0.00079	0.00074
8	0.05647	0.06201	0.06015	0.06456	0.06776	0.06600	0.06287	0.02716	0.07801	0.12021
9	0.02115	0.02261	0.03701	0.03588	0.02711	0.02568	0.02341	0.00966	0.02793	0.02603
10	0.02550	0.02542	0.02570	0.03468	0.02592	0.02593	0.02434	0.01079	0.03449	0.03250
11	0.02545	0.02661	0.02557	0.02857	0.03078	0.03062	0.02988	0.01201	0.04151	0.03314
12	0.01617	0.02021	0.01551	0.02730	0.01479	0.01507	0.01341	0.00740	0.01523	0.01518
13	0.07492	0.08345	0.08065	0.08817	0.17652	0.16633	0.08454	0.10566	0.11985	0.10667
14	0.01465	0.01566	0.01646	0.01695	0.00815	0.01947	0.00742	0.00305	0.01055	0.00955
15	0.00830	0.01028	0.00918	0.00880	0.00792	0.00762	0.00732	0.00318	0.00882	0.00868
16	0.00967	0.01256	0.01619	0.01013	0.00305	0.00169	0.00231	0.00087	0.00181	0.00176
17	0.01853	0.02229	0.03915	0.01905	0.01167	0.00926	0.00902	0.00421	0.00956	0.01037
18	0.00936	0.00985	0.02332	0.00922	0.01107	0.00759	0.00747	0.00673	0.00936	0.00727
19	0.00709	0.00540	0.00546	0.01160	0.00654	0.00672	0.00597	0.00260	0.00927	0.00770
20	0.00481	0.00230	0.00190	0.00333	0.00181	0.00143	0.00090	0.00081	0.00092	0.00084
21	1.02859	0.00695	0.01749	0.00668	0.00728	0.00586	0.03794	0.00322	0.00753	0.00658
22	0.13788	1.16608	0.03801	0.06034	0.01387	0.01453	0.04148	0.00490	0.01532	0.01353
23	0.00516	0.00562	1.04298	0.00584	0.01313	0.00792	0.00657	0.00260	0.00748	0.00662
24	0.01939	0.01477	0.01678	1.05940	0.01764	0.01577	0.01983	0.00757	0.02092	0.01982
25	0.05417	0.06096	0.05746	0.06259	1.13642	0.07413	0.05983	0.03525	0.07852	0.06875
26	0.01924	0.02199	0.02194	0.02542	0.02613	1.21968	0.02107	0.01067	0.04922	0.02950
27	0.04666	0.05106	0.04885	0.05479	0.05990	0.06248	1.06701	0.02388	0.08020	0.06632
28	0.09301	0.10414	0.09914	0.10635	0.11671	0.10862	0.10849	1.18769	0.13772	0.13675
29	0.13686	0.15032	0.14437	0.16025	0.14496	0.16214	0.12603	0.06306	1.16959	0.16797
30	0.31068	0.34175	0.33125	0.35382	0.37710	0.37440	0.34744	0.14934	0.45032	1.39658
31	0.40856	0.44402	0.42711	0.46108	0.49957	0.49601	0.47889	0.20234	0.58417	0.57553
32	0.00328	0.00372	0.00347	0.00368	0.00381	0.00376	0.00360	0.00156	0.00477	0.00413
33	0.02251	0.02466	0.02408	0.02566	0.02737	0.03373	0.02525	0.01094	0.03330	0.02964
34	0.06567	0.07018	0.06699	0.07856	0.08981	0.08111	0.08181	0.03229	0.13131	0.11187
35	0.02005	0.02229	0.02138	0.02314	0.02415	0.02341	0.05510	0.00968	0.03143	0.02860
36	0.21895	0.24020	0.23324	0.24800	0.25979	0.25264	0.24301	0.10529	0.29093	0.27808
37	0.02150	0.02357	0.02289	0.02571	0.02742	0.02519	0.02518	0.01106	0.03012	0.02819
38	0.02778	0.03002	0.02918	0.03162	0.03322	0.03330	0.03270	0.01453	0.03968	0.03761

Table 7

BAY AREA DIRECT, INDIRECT AND INDUCED IMPACT FLOW TABLE-1982

	31	32	33	34	35	36	37	38
1	0.01326	0.01225	0.01129	0.01594	0.01485	0.01570	0.01549	0.01894
2	0.00253	0.00315	0.00243	0.00335	0.00230	0.00309	0.00322	0.00689
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.03668	0.03011	0.02056	0.02957	0.02345	0.02803	0.03316	0.06185
7	0.00072	0.00068	0.00064	0.00169	0.00064	0.00088	0.00086	0.00102
8	0.07099	0.06808	0.06494	0.09182	0.06792	0.09265	0.09155	0.11098
9	0.02543	0.06919	0.03228	0.03298	0.03011	0.03577	0.03340	0.03989
10	0.02791	0.03001	0.02561	0.03784	0.02505	0.03427	0.03911	0.04042
11	0.03889	0.04091	0.02874	0.05958	0.02924	0.04023	0.08161	0.05100
12	0.01435	0.02229	0.01746	0.02110	0.01325	0.03237	0.01888	0.02571
13	0.09595	0.10763	0.09505	0.13176	0.08823	0.11889	0.12389	0.18348
14	0.00764	0.01440	0.00884	0.01156	0.00780	0.01225	0.01011	0.01192
15	0.00812	0.01099	0.00971	0.01043	0.00707	0.01017	0.01001	0.01264
16	0.00160	0.00166	0.00350	0.00276	0.00149	0.00200	0.00212	0.00289
17	0.00837	0.00837	0.02678	0.01278	0.00755	0.00976	0.01111	0.01431
18	0.00579	0.00626	0.01128	0.01839	0.00549	0.00658	0.00699	0.01572
19	0.00898	0.00792	0.04128	0.04524	0.00662	0.00785	0.00950	0.01023
20	0.00084	0.00085	0.00169	0.00204	0.00073	0.00096	0.00101	0.00465
21	0.00692	0.00789	0.01148	0.01061	0.00619	0.00740	0.01012	0.01308
22	0.01381	0.01388	0.03658	0.03963	0.01171	0.02021	0.02052	0.02134
23	0.00644	0.00598	0.01984	0.00914	0.00665	0.00796	0.00784	0.01094
24	0.01856	0.02480	0.02803	0.04059	0.02457	0.03622	0.03206	0.02741
25	0.06660	0.06435	0.06399	0.09542	0.06093	0.08253	0.08507	0.12268
26	0.02178	0.02249	0.02414	0.03154	0.02606	0.02694	0.03156	0.05134
27	0.06697	0.08114	0.05764	0.10009	0.05712	0.07448	0.07925	0.08653
28	0.12452	0.19790	0.11315	0.15434	0.11443	0.14810	0.15513	0.28224
29	0.13714	0.14050	0.17016	0.19111	0.12889	0.17804	0.17572	0.21524
30	0.39476	0.35622	0.36686	0.51701	0.34852	0.48579	0.47594	0.56597
31	1.71053	0.57741	0.47786	0.70643	0.49447	0.65600	0.67693	0.73874
32	0.00420	1.00364	0.00364	0.00641	0.00386	0.00494	0.00544	0.00577
33	0.02811	0.02956	1.02648	0.03777	0.02652	0.03518	0.03497	0.04103
34	0.10299	0.12814	0.07926	1.15573	0.09940	0.10213	0.11322	0.12141
35	0.02519	0.02355	0.02311	0.03429	1.11673	0.03123	0.03471	0.03670
36	0.28002	0.24204	0.24934	0.35099	0.24386	1.39041	0.33016	0.39335
37	0.02743	0.02922	0.02685	0.04130	0.02781	0.03396	1.03549	0.03903
38	0.04097	0.03738	0.03168	0.05127	0.03123	0.04307	0.04762	1.05613

Table 8

INCOME MULTIPLIERS OF 1982 ABAG REGIONAL INPUT/OUTPUT MODEL

SECTOR NAME	OPEN MODEL			CLOSED MODEL		
	OUTPUT MULTIPLIER	HOUSEHOLD ROW	DIRECT & INDIRECT	TYPE I MULTIPLIER	DIR. IND., INDUCED	TYPE II MULTIPLIER
AGRICULTURE, FORESTRY, AND FISHERIES	1.4040	0.4798	0.6304	1.31	1.5971	3.33
MINING	1.2958	0.7430	0.8587	1.16	2.1756	2.93
CONSTRUCTION, RESIDENTIAL	1.6059	0.2680	0.5077	1.89	1.2862	4.80
CONSTRUCTION, NON-RESIDENTIAL	1.5145	0.4395	0.6405	1.46	1.6229	3.69
CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES	1.6052	0.4651	0.6983	1.50	1.7691	3.80
MAINTENANCE AND REPAIR	1.3383	0.7571	0.8833	1.17	2.2380	2.96
ORDNANCE	1.3637	0.3641	0.5043	1.38	1.2776	3.51
FOOD AND BEVERAGES	1.4741	0.2282	0.4056	1.78	1.0276	4.50
TEXTILE AND APPAREL PRODUCTS	1.3107	0.3045	0.4067	1.34	1.0304	3.38
LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES	1.2705	0.3369	0.4344	1.29	1.1005	3.27
PRINTING AND PUBLISHING	1.3090	0.4100	0.5377	1.31	1.3624	3.32
CHEMICALS AND ALLIED PRODUCTS	1.3492	0.1940	0.3086	1.59	0.7818	4.03
PETROLEUM REFINING AND RELATED INDUSTRIES	1.1716	0.0920	0.1476	1.60	0.3738	4.06
RUBBER AND LEATHER PRODUCTS	1.3249	0.4250	0.5337	1.26	1.3522	3.18
STONE, CLAY, GLASS, AND CONCRETE PRODUCTS	1.3787	0.4263	0.5626	1.32	1.4254	3.34
PRIMARY METAL INDUSTRIES	1.4231	0.2589	0.4071	1.57	1.0314	3.98
FABRICATED METAL PRODUCTS	1.4227	0.3323	0.4875	1.47	1.2351	3.72
NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS	1.2118	0.3340	0.4141	1.24	1.0492	3.14
COMPUTERS AND OFFICE EQUIPMENT	1.5670	0.3910	0.6175	1.58	1.5645	4.00
ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS	1.3883	0.3910	0.5425	1.39	1.3744	3.52
HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V	1.3167	0.3633	0.4908	1.35	1.2435	3.42
ELECTRONIC COMPONENTS AND EQUIPMENT	1.3288	0.4072	0.5385	1.32	1.3643	3.35
TRANSPORTATION EQUIPMENT	1.2817	0.4146	0.5229	1.26	1.3249	3.20
PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEO	1.3219	0.4276	0.5559	1.30	1.4085	3.29
TRANSPORTATION SERVICES	1.3659	0.4510	0.5822	1.29	1.4750	3.27
TRUCK TRANSPORTATION	1.5187	0.3775	0.5661	1.50	1.4342	3.80
COMMUNICATION	1.2758	0.4285	0.5443	1.27	1.3789	3.22
UTILITIES	1.3064	0.1621	0.2360	1.46	0.5978	3.69
WHOLESALE TRADE	1.3883	0.4873	0.6517	1.34	1.6511	3.39
RETAIL TRADE	1.3419	0.4885	0.6226	1.27	1.5775	3.23
F.I.R.E.	1.3846	0.4400	0.6147	1.40	1.5573	3.54
HOTELS AND LODGING PLACES	1.6070	0.3074	0.5411	1.76	1.3710	4.46
PERSONAL AND REPAIR SERVICES	1.3391	0.4222	0.5588	1.32	1.4157	3.35
BUSINESS AND PROFESSIONAL SERVICES	1.4672	0.5836	0.7862	1.35	1.9919	3.41
AMUSEMENT AND RECREATION SERVICES	1.3532	0.3914	0.5393	1.38	1.3662	3.49
HEALTH SERVICES	1.2384	0.6620	0.7690	1.16	1.9483	2.94
EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFI	1.3722	0.5821	0.7373	1.27	1.8681	3.21
GOVERNMENT NOT ELSEWHERE CLASSIFIED	1.4891	0.7100	0.8808	1.24	2.2315	3.14

Table 9

EMPLOYMENT MULTIPLIERS OF 1982 ABAG REGIONAL INPUT-OUTPUT MODEL

SECTOR NAME	EMPT CHANGE PER $1,000	DIRECT & INDIRECT	TYPE I	DIR. IND., INDUCED	TYPE II
AGRICULTURE, FORESTRY, AND FISHERIES	0.0424	0.0481	1.14	0.0875	2.06
MINING	0.0104	0.0142	1.37	0.0678	6.52
CONSTRUCTION, RESIDENTIAL	0.0249	0.0348	1.40	0.0665	2.67
CONSTRUCTION, NON-RESIDENTIAL	0.0115	0.0194	1.69	0.0593	5.16
CONSTRUCTION, HIGHWAYS AND PUBLIC UTILITIES	0.0214	0.0303	1.42	0.0739	3.45
MAINTENANCE AND REPAIR	0.0164	0.0214	1.31	0.0765	4.67
ORDNANCE	0.0087	0.0136	1.57	0.0450	5.19
FOOD AND BEVERAGES	0.0074	0.0148	2.00	0.0401	5.40
TEXTILE AND APPAREL PRODUCTS	0.0189	0.0242	1.28	0.0495	2.63
LUMBER, WOOD AND PAPER PRODUCTS AND FURNITURES	0.0122	0.0159	1.30	0.0430	3.51
PRINTING AND PUBLISHING	0.0158	0.0207	1.31	0.0543	3.43
CHEMICALS AND ALLIED PRODUCTS	0.0089	0.0133	1.49	0.0325	3.66
PETROLEUM REFINING AND RELATED INDUSTRIES	0.0010	0.0026	2.62	0.0118	11.88
RUBBER AND LEATHER PRODUCTS	0.0126	0.0170	1.34	0.0503	3.98
STONE, CLAY, GLASS, AND CONCRETE PRODUCTS	0.0117	0.0166	1.41	0.0516	4.41
PRIMARY METAL INDUSTRIES	0.0118	0.0172	1.46	0.0426	3.61
FABRICATED METAL PRODUCTS	0.0110	0.0169	1.53	0.0473	4.29
NON-ELECTRICAL MACHINERY, EXCEPT COMPUTERS	0.0196	0.0230	1.17	0.0488	2.49
COMPUTERS AND OFFICE EQUIPMENT	0.0088	0.0153	1.73	0.0538	6.11
ELECTRIC TRANSMISSION AND INDUSTRIAL APPARATUS	0.0238	0.0296	1.24	0.0635	2.66
HOUSEHOLD APPLIANCES,LIGHTING EQUIPMENT,RADIO,T. V	0.0112	0.0156	1.40	0.0463	4.14
ELECTRONIC COMPONENTS AND EQUIPMENT	0.0138	0.0185	1.34	0.0521	3.76
TRANSPORTATION EQUIPMENT	0.0061	0.0099	1.62	0.0425	6.96
PROFESSIONAL, SCIENTIFIC EQUIPMENT AND MISCELLANEO	0.0170	0.0218	1.28	0.0565	3.32
TRANSPORTATION SERVICES	0.0184	0.0231	1.26	0.0594	3.24
TRUCK TRANSPORTATION	0.0166	0.0240	1.44	0.0593	3.56
COMMUNICATION	0.0165	0.0211	1.28	0.0550	3.34
UTILITIES	0.0036	0.0056	1.56	0.0203	5.64
WHOLESALE TRADE	0.0139	0.0207	1.49	0.0613	4.42
RETAIL TRADE	0.0363	0.0410	1.13	0.0798	2.20
F.I.R.E.	0.0079	0.0128	1.62	0.0512	6.45
HOTELS AND LODGING PLACES	0.0318	0.0400	1.26	0.0738	2.32
PERSONAL AND REPAIR SERVICES	0.0233	0.0281	1.21	0.0630	2.70
BUSINESS AND PROFESSIONAL SERVICES	0.0283	0.0360	1.27	0.0851	3.00
AMUSEMENT AND RECREATION SERVICES	0.0320	0.0392	1.23	0.0728	2.28
HEALTH SERVICES	0.0259	0.0298	1.15	0.0777	3.01
EDUCATION SERVICES ,NON-COMMERCIAL R & D,NON-PROFI	0.0341	0.0396	1.16	0.0856	2.51
GOVERNMENT NOT ELSEWHERE CLASSIFIED	0.0246	0.0304	1.24	0.0854	3.47